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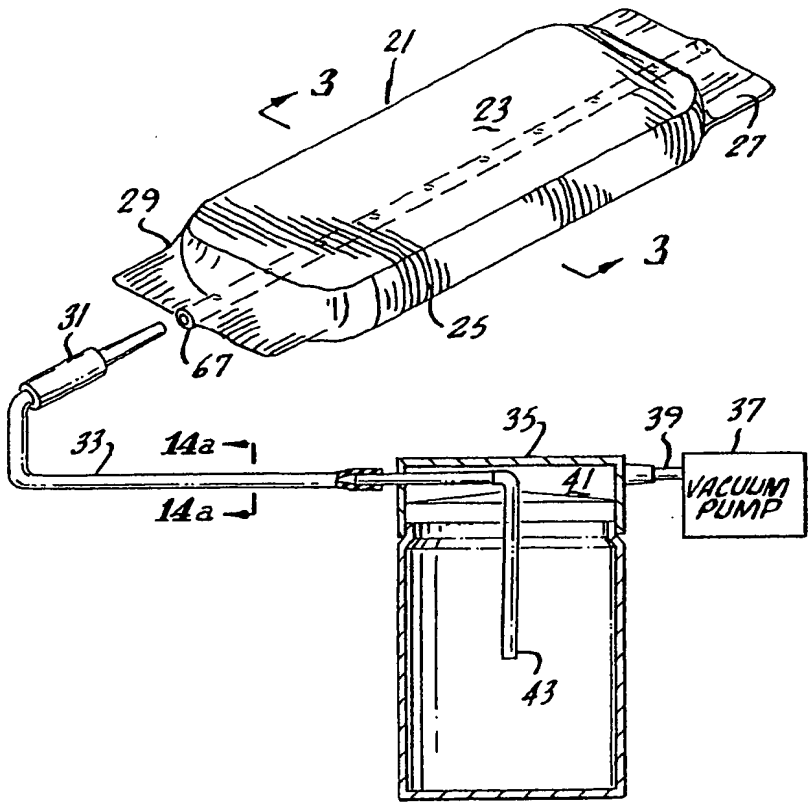
(54) Title: IMPROVED PAD AND PAD TUBE CONNECTOR FOR THE MANAGEMENT OF URINARY INCONTINENCE

(57) Abstract

An improved pad and pad tube connector is utilized with a urine aspiration system having a vacuum pump and collection reservoir. The improved pad utilizes a perforated tube, within its volume, and is surrounded by a wicking structure which wicks liquid away from the volume of the pad and towards the central perforated tube, and frictionally engages the absorptive material in the pad to provide greater pad stability. The improved connector of the present invention engages the centrally located perforated tube within the pad at a point near the end of the pad, as well as the material surrounding the pad, for a more secure attachment.



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IMPROVED PAD AND PAD TUBE CONNECTOR FOR THE MANAGEMENT OF URINARY INCONTINENCE

BACKGROUND OF THE INVENTION

The present invention relates to an improved appliance for use in urine collection and disposal systems and more particularly, to an improved pad and pad tube connector which is more efficient in the urine collection and disposal task.

Incontinence in wheelchair and bed patients, whether in hospitals, nursing homes, or at home, presents a particular and continuing problem with respect to the care of such patients. Bodily incontinence is even more prevalent among the elderly. For anatomical reasons, the design of urine collection appliances for women is particularly difficult.

In an effort to keep bed patients' bedding clean and dry so that the patient may be as comfortable as possible, it is frequently necessary to change the bedding several times a day for a patient having urinary incontinence. After a urinary discharge, there is a delay before the attendant becomes aware of the soiled and wet bedding so that steps can be taken to replace it. It is during this time that the patient is in contact with the urine-soaked bedding and is most prone to develop a rash or sores due to such exposure. Similar problems arise with respect to incontinent patients confined to wheelchairs.

In the above-mentioned circumstances of a patient lacking the requisite mobility or self-management of the effects of their incontinence, the use of

disposable absorbent pads of some kind have been previously employed. There are many such disposable pads commercially available for this purpose, such as pads normally involving an absorbent core, typically a cellulose wadding or other hydroscopic material. The problem with pads of this construction is their inability to receive and retain urine at significantly high flow rates or volumes without leakage. In addition, the pads are typically bulky, either when wet from use or in the dry state, and still effectively require the need for repeated replacement, at considerable inconvenience, and, therefore, cost to those in attendance with the patient. Replacement of the urine soaked bulky pads involves handling the pads, which is an unpleasant task. Further, repeated replacement is also associated with the inconvenience of storing a great number of pads to be ready for use, and the disposal of a large number of pads, creating a volumetric disposal problem.

Earlier attempts at dealing with the urinary incontinence problem include U.S. Patent Nos. 3,349,768; 4,610,675; 4,713,065; 4,200,102; and 4,886,508. Foreign patents dealing with urinary incontinence include U.K. Patent No. 2,148,126A and French Patent No. 1,485,683.

A more recent method of dealing with urinary incontinence is disclosed in U.S. Patent No. 4,747,166 to David H. Kuntz, entitled "Fluid Aspiration System for the Management of Urinary Incontinence." The aspiration system disclosed therein includes a vacuum pump and urine collection reservoir connected via a tube to an absorbent pad. The tube was connectable to the pad in one case through an opening and in another case by an opening engaging a coupling adapter. The pad disclosed therein had a series of layers of highly absorbent cellulose tissue. The tissue layers are surrounded at the bottom by a thin impermeable layer and at the top by a permeable

layer, the two layers joined at the middle edge of the pad. A sealing ring was provided to sealably encompass the genital area to provide sealing there.

In the use of the incontinence device with the aspiration system of Kuntz, it has been found that over time, and especially as the patient changes position either on their own or by attendants during changes in the patient's bedding, etc., a significant force is applied on the connecting tube and in a direction away from the pad. Such force, when taken to failure of the connection, occurs through one of two mechanisms. The connector which joins the tube to the pad may fail by becoming disconnected. In this case, no further aspiration is applied to the pad. Lacking aspiration, the pad then fills to overflow either at the point of tube connection or about the edges. In the second mode of failure, the perforated tube within the volume of the pad may become dislodged axially from the pad while still connected to the connecting tube and connector. To the extent to which the tube within the pad is displaced from the pad, proper aspiration will no longer occur and the pad will become prone to filling and leaking.

Several methods are known in the art for connecting tubes to tubular receptacles and other appliances. Such devices and methods are described in U.S. Patent Nos. 4,969,879; 4,895,570; 4,752,292; 3,394,954; and 2,452,643. All of the above cited examples of previously known art contain limitations, and undesirable aspects which render them undesirable for utilization in conjunction with a urinary aspiration system.

What is needed is an improved design of an absorbent pad, utilizable with an aspiration system, and having a urine collection structure which will not

readily become dislodged from the pad. The urine collection structure within the pad should contribute to the even drainage of the pad and reduce unwanted collection at points within the pad volume. Further, a connector is needed to be utilized in conjunction with such an improved pad which will act both to secure the connection of the aspiration tube to the internally located urine collection structures, and act to resist the axial movement of those urine collection structures with respect to the pad, and further to be easily disconnected when desired.

BRIEF SUMMARY OF THE INVENTION

The improved pad and pad tube connector of the present invention, utilizable with a urine aspiration system having a vacuum pump and urine collection reservoir, utilizes a perforated aspiration tube, within an absorbent pad, which is bound to and surrounded by a wicking structure which wicks liquid away from the surfaces, interior and edges of the pad and towards the central perforated tube. The wicking structure provides additional frictional engagement of the tube to the absorbent material forming the predominate volume of the pad. The porous structure and the layers of wicking material together provide an improved assembly to wick liquid into the perforated aspiration tube. The intimate contact between layers serve as additional routes for wicking to occur in a controlled fashion into the perforated aspiration tube.

The improved connector of the present invention engages the perforated aspiration tube encapsulated in the wicking structure at a point near the end of the pad, by either or a combination of a friction fit with closably urged jaws. The liquid sealing is performed about an interface between the connector and the

perforated aspiration tube at a point within the wicking structure.

The improved connector includes an ejection mechanism which enables the urine soaked pad to be removed from the connector without handling the pad. The connector is grasped with one hand while the other hand urges the connecting tube away from the connector. The snout end of the connector is withdrawn, terminating its engagement with the perforated tube, causing the urine soaked pad to fall away from the connector, typically into a waste container.

BRIEF DESCRIPTION OF THE DRAWINGS

Other aspects, features and advantages of the invention, its configuration, construction, and operation will be best understood from the following detailed description, taken in conjunction with the accompanying drawings in which:

Figure 1 illustrates the aspiration system employing the improved pad and pad tube connector of the present invention, shown in perspective, connected to a generalized urine collection reservoir, shown in generalized section, and connected to a vacuum pump which is schematically illustrated;

Figure 2 is a perspective cutaway view of the pad of Figure 1 illustrating its layering of materials;

Figure 3 is a cross-section of a first embodiment of the pad of Figure 1 taken along line 3-3 of Figure 1;

Figure 4 is a cross-section of a second embodiment of the pad of Figure 1 taken along line 3-3 of Figure 1;

Figure 5 is a cross-section of a third embodiment of the pad of Figure 1 taken along line 3-3 of Figure 1;

Figure 6 is an expanded cross-sectional view of the wicking structure shown in Figures 2-5;

Figure 6a is an expanded cross-sectional view of the wicking structure shown in Figure 6, but illustrating a petal shaped void;

Figure 7 is a frontal view of a first, one-piece embodiment of a connector utilizable with the pad of Figures 1-5;

Figure 8 is a top view of the first embodiment of the connector of Figure 7;

Figure 9 is a side sectional view of the first embodiment of the connector of Figures 7 and 8;

Figure 10 is a rear view of the first embodiment of the connector of Figures 7, 8 and 9;

Figure 11 is a perspective view of the first embodiment of the connector of Figures 7, 8, 9 and 10;

Figure 12 is a side sectional view of a second, two-piece embodiment of a connector utilizable with the pad of Figures 1-5;

Figure 13 is a side sectional view of a third, four-piece embodiment of a connector utilizable with the pad of Figures 1-5;

Figure 14 is a side sectional view of a fourth, two-piece embodiment of a connector utilizable with the pad of Figures 1-5;

Figure 14a is a cross-sectional view of the tubing of Figure 1 taken along line 14a-14a of Figure 1;

Figure 15 is a side sectional view of the connector of the first embodiment of Figures 7-11 engaging a connecting tube;

Figure 16 is a side sectional view of the connector of the first embodiment in fully engaged position with a connecting tube and with the pad of Figures 1-5;

Figure 17 is a side sectional view of a fifth embodiment of a two-piece connector having an ejection mechanism;

Figure 18 is a side sectional view of one-piece of the two-piece connector of the embodiment of Figure 17 shown in relation to a tube;

Figure 19 is a side sectional view of one-piece of the two-piece connector of the embodiment of Figures 17 and 18 shown connected to a tube;

Figure 20 is a side sectional view of the first piece of the two-piece connector of the fifth embodiment being fitted with its associated second piece;

Figure 21 is a side sectional view of the connector of the fifth embodiment in assembled and partially retracted position;

Figure 22 is a side sectional view of the connector of Figures 17 and 21 fully engaging a dry absorbent pad;

Figure 23 is a side sectional view of the connector of Figure 22 in a position partially ejecting a wet absorbent pad;

Figure 24 is a side sectional view of the connector of Figures 22 and 23 in a position fully ejecting a wet absorbent pad;

Figure 25 is a side sectional view of a sixth embodiment of the pad tube connector of the present invention;

Figure 26 is a side sectional view of the embodiment shown in Figure 25 in extended position ready to accept connection to an absorbent pad;

Figure 27 is a side sectional view of the embodiment of Figures 25 and 26 illustrated in engaged connection with an absorbent pad;

Figure 28 is a side sectional view of the embodiment of Figures 25, 26 and 27 illustrated in the position of fully ejecting a wet absorbent pad;

Figure 29 is a side sectional view of a seventh embodiment of the pad tube connector of the present invention;

Figure 30 is a side sectional view of the embodiment shown in Figure 29 in extended position ready to accept connection to an absorbent pad;

Figure 31 is a side sectional view of the embodiment of Figures 30 and 31 illustrated in engaged connection with an absorbent pad; and

Figure 32 is a side sectional view of the embodiment of Figures 29, 30, 31 and 32 illustrated in the position of fully ejecting a wet absorbent pad.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figure 1, a generally rectangular absorptive pad 21 has an upper surface 23. The absorptive pad 21 is somewhat similar in overall external appearance, and is about the same size and shape as commercially available sanitary napkins. Absorptive pad 21 is intended to make direct contact with a patient's body surrounding the urethral opening, and is easily positionable against the patient, especially between the patient's body and garments. Absorptive pad 21 is flexible in all directions along its upper surface 23, and is, therefore, easily fittable with all patients.

The exterior of the absorptive pad 21 is covered with an essentially non-wetting permeable material 25, which envelops the absorptive pad 21, along its length and is sealed at one end 27, hereafter referred to the closed end 27, and may be partially or totally closed at the other end 29, hereafter referred to as the tube end 29.

An improved connector 31 removably couples a tube 33 to tube end 29 of absorptive pad 21. The other end of tube 33 is connected to a urine collection vessel

35. Urine collection vessel 35 is further connected to a vacuum pump 37, or similar pressure reducing device, via a tube 39, and is configured to collect urine through a pressure reduction action, and to isolate vacuum pump 37 from any liquids flowing through tube 33. Urine collection vessel 35 is configured to permit tube 39 to draw air from a space 41 at the upper portion of urine collection vessel 35, creating a reduced pressure, and causing delivery of a mixture of urine and air through tube 33, and through a downcomer tube 43 directed into the urine collection vessel 35.

Figure 2 is a partially cut away view of the preferred embodiment of the pad of the present invention. At the bottom of pad 21 is an adhesive layer having a plastic or other non-sticking tear-away strip 45 which may be removed to expose the adhesive layer. The adhesive layer, to be shown later, is attached to the outer permeable non-wetting layer 25 and facilitates the fixation of the pad 21 to the inner surfaces of the user's garments, diaper or covering, when the pad 21 is utilized and held in place with a garment, diaper or covering. At the outer periphery, the permeable non-wetting layer 25 is illustrated as surrounding all of the layers in absorbent pad 21. At the top 23 of the absorbent pad 21, and adjacent and inward of the permeable non-wetting layer 25, is a highly absorbent inner layer 51 which extends continuously enclosing an inner volume of the absorbent pad 21, and within the boundary of the permeable non-wetting layer 25.

Near the top 23 of absorbent pad 21, and adjacent and below the highly absorbent inner layer 51, is a structure collectively referred to as a wick tube assembly 53. Wick tube assembly 53 is made up of at lest a first layer of wicking material 55 and at least a second layer of wicking material 57 sandwiching a tube

59. The tube 59 is perforated, as will be shown later, and will hereinafter be referred to as perforated tube 59. Generally, wicking materials 55 and 57 are, before being brought together to form wick tube assembly 53, generally planar, porous sheets of material. In the referenced embodiment wicking materials 55 and 57 have a paper towel like consistency. The wicking materials 55 and 57 must be absorbent enough to attract liquid and transmit liquids through wicking action, but not retentive of liquid in a manner which would inhibit wicking. The sheets of material forming the wicking materials 55 and 57 are typically glued or otherwise fixed to each other, and to perforated tube 59, over the bulk of their contacting surfaces. This ensures that air is not drawn into the perforated tube 59 through the boundary layer between noncontacting layers. In Figure 2, both of the layers of the wicking materials 55 and 57 are shown as being coextensive with each other. However, one of the layers of the wicking materials 55 and 57 may be abbreviated in width. Wicking material layers 55 and 57 may have similar or dissimilar absorptive characteristics.

Figure 3 is a cross-section taken along line 3-3 of Figure 1, and is essentially equivalent to a cross-section taken at any point along the length of the central portion of the absorbent pad 21. Now referring to both Figures 2 and 3, note that the wicking materials 55 and 57 conform closely and are preferably adhered to the outer surface of the perforated tube 59, to ensure efficient operation. This close conformance ensures that there will be no volumes of space of a size where liquids will collect rather than be wicked. Nor will there exist a channel that serves as a shunt for air to flow as this would decrease the effectiveness of the wick in drawing liquid from its perimeter and from the inner volume of pad 21.

Note, that perforated tube 59 has a linear bore formed therethrough and is provided with one or more apertures, namely generally upper aperture 61 and generally lower aperture 63. The apertures are most easily formed by punching or drilling a single bore through perforated tube 59. A series of generally upper and lower apertures 61 and 63 are formed throughout the length of perforated tube 59 residing within absorbent pad 21. The perforated tube is sealed closed at one end.

Typically, the lengths of perforated tube 59 which are utilized within absorbent pad 21 are formed by punching or drilling straight through the perforated tube 59 at intervals. The axes of the multiple bores of the upper and lower apertures 61 and 63 may lie within the same plane, such that all upper apertures 61 are at the uppermost surface of the perforated tube 59, and all lower apertures are at the lowermost surface of the perforated tube 59. Perforated tube 59 may be sandwiched between the wicking layers 55 and 57 with apertures 61 and 63 in a plane which may vary from perpendicular to parallel to the horizontal axis of the wick tube assembly 53. Perforated tube 59 is usually obtained in lengths which have been machine punched or drilled. Alternatively, the perforated tube 59 may be perforated or punched in the process of assembly of pad 21.

The perforated tube 59 extends for substantially the length of the absorbent pad 21. At the closed end 27 of the absorbent pad 21, the perforated tube 59 is sealed closed at its end. The other end of perforated tube 59, at the tube end of the pad 21 is left open, and terminates at a plane, and has an end profile matching the cross-sectional shape of the sectional view of perforated tube 59 as shown in Figures 1, 2, 3, 4, 5 and 6.

Underneath wick tube assembly 53, and adjacent the highly absorbent inner layer 51 is the bulk absorbent material 69. The bulk absorbent material 69 forms a core of urine absorptive material. This material has the characteristic of rapid absorption and release of urine, and acts as a temporary reservoir for increased holding capacity. Note, that the highly absorbent inner layer 51 completely surrounds the bulk absorbent material 69. Layer 51 although highly absorbent, ready releases liquid to wick tube assembly 53 and bulk absorbent material 69. With this configuration, moisture within bulk absorbent material 69 will readily move into and through the highly absorbent inner layer 51. As layer 51 collects moisture it will be more subject to being withdrawn into the wick tube assembly 53.

An impermeable lower liner 71 is located within the permeable and non-wetting layer 25, and outside the highly absorbent inner layer 51. In this manner, the highly absorbent inner layer 51, will be prevented from wetting the patient's garments or bedding. The impermeable lower liner 71 does not extend circumferentially completely around the highly absorbent inner layer 51, but surrounds inner layer 51 at its bottom and side surfaces. Impermeable lower linear 71 may extend partially or totally upwardly about the sides of pad 21.

At the bottom and side of absorbent pad 21, the impermeable lower liner 71 separates the permeable non-wetting layer 25, and the outside of the highly absorbent inner layer 51. However, at the sides of absorbent pad 21, near the top, the impermeable lower liner 71 ends, and the portions of the permeable non-wetting layer 25, and outside the highly absorbent inner layer 51, which extend over the top 23 of absorbent pad 21, are in contact with each other. An optional adhesive layer 73,

referred to earlier, is illustrated at the bottom of the absorbent pad 21, immediately adjacent the permeable non-wetting layer 25. In Figure 3 it is shown without the protective non-sticking tear-away strip 45. Adhesive layer 73 is used to secure absorbent pad 21 to the inside of a patient's clothing, to better secure the absorbent pad 21 to the patient.

A second embodiment of the absorbent pad 21 is shown in Figure 4, wherein the wick tube assembly 53 is located within the bulk absorbent material 69. The other layers, namely permeable non-wetting material 25, highly absorbent inner layer 51 and impermeable liner 71 surround the bulk absorbent material 69 in the same manner as was illustrated in Figure 2.

A third embodiment of the absorbent pad 21 is shown in Figure 5, wherein the wick tube assembly 53 is located beneath the bulk absorbent material 69, and between the highly absorbent inner layer 51 and the impermeable liner 71.

A closer cross-sectional view of the wick tube assembly 53 is illustrated in Figure 6. Note, the extent to which the first layer of wicking material 55 and a second layer of wicking material 57 have the area of one side of their surface completely taken up with attachment, either to the exterior surface of perforated tube 59 or to the opposing surface of each other. The transition from areas of the first and second wicking materials 55 and 57 which are in contact with each other, to the areas of contact of the first and second wicking materials 55 and 57 about the external surface of perforated tube 59, does not create a significant space at the point of transition.

Note, also that the ends of apertures 61 and 63 at the outer surface of perforated tube 59 are completely covered by the material from first and second wicking materials 55 and 57. When apertures 61 and 63 are in planes other than perpendicular to the layers 55 and 57 they are still covered by layers 55 and 57. In this manner, none of the upper and lower apertures 61 and 63 are exposed to the ambient atmosphere, and will always be exposed, when absorbent pad 21 is wet, to wicked liquid urine.

The portions of first and second wicking materials 55 and 57 which adhere to each other and the perforated tube 59, form an extended planar surface which is in contact with other elements of pad 21. When the extended planar wicking surface is directly in contact with other absorbent material, including either bulk absorbent material 69, or highly absorbent inner layer 51, significant frictional resistance to axial and lateral movement is achieved.

The internal portion of the perforated tube 59 will preferably have a circumferentially smooth configuration. The cross-section of the inside of perforated tube 59, appearing in Figures 1, 2, 3, 4, 5 and 6 has a circular-shaped void 67. It is understood that other shapes, including cross-sectional shapes for the void 67 within perforated tube 59 may be utilized, such as that shown in Figure 6a which is more efficient at moving a liquid gas two-phase mixture, and with less noise from gurgling, etc.

All of the embodiments of the improved pad of the instant invention, which were shown in Figures 1-6a are amenable for connection to tube 33 of Figure 1, utilizing any embodiment of the improved connector of the instant invention, which is illustrated in detail in the

remaining figures. Referring to Figure 7, a first embodiment of a connector 101 is shown from the front end, namely the end which will connect to the perforated tube 59 at the end of the absorbent pad 21.

Connector 101 has a generally square profile and since it is of one piece construction, its structural members are continuous with each other. Connector 101 includes an upper semicircular jaw 103, opposing a lower semicircular jaw 105, and an elongated snout 107 between the jaws 103 and 105. Upper and lower semicircular jaws 103 and 105, are shaped concavely toward said elongated snout 107. Upper and lower semicircular jaws 103 and 105, and elongated snout 107 are supported by and extend from a flange 109. A bore 110 extends completely through the connector 101.

Referring to Figure 8, the elongated snout 107 can be seen to transition into a beveled portion 111, and terminating at an axially smaller portion 113. The upper semicircular jaw 103 is seen as having a wedge profile, and is continuous with the remaining upper surface area of the connector 101. At the end of connector 101, a raised linear bump 115 extends across the upper width of the connector 101, as can be seen in Figures 6 and 7. Similarly, a raised linear bump 117 extends across the lower width of the connector 101.

Referring to Figure 9, a sectional view of the connector 101 reveals a circular fitting 119 having a frusto-conical surface 121, and a reduced outer diameter surface 122. The predominant surface of the connector shown in Figure 8 is seen in section to be an upper lever 123, and opposes a lower lever 125. The upper and lower semicircular jaws 103 and 105 have a series of teeth 127 on their mutually opposing circumferentially inwardly oriented surfaces. The teeth 127 on each of the upper

and lower semicircular jaws 103 and 105 are of differing size. Each one of the teeth are of a relatively larger size in relation to the relative nearness of the tooth to the flange 109.

The inner surfaces of the upper and lower semicircular jaws 103 and 105 extend away from elongated snout 107 in a direction toward the flange 109, forming a triangular cross-sectional space. Connector 101 is of one-piece construction and is made from a material which is flexible to a small degree. The material should be flexible enough that the upper and lower levers 123 and 125 may be flexibly pressed together. However, the material should not be so flexible that when upper and lower levers 123 and 125 are to be flexibly pressed together that the upper and lower semicircular jaws 103 and 105 fail to move angularly away from each other.

A rearwardly looking view is illustrated in Figure 10, and illustrates the clearance between the upper and lower levers 123 and 125, and their relationship to the circular fitting 119.

In Figure 11, the first embodiment illustrated in Figures 7-10 is shown in perspective. Clearly shown is the transition from the upper and lower levers 123 and 125 to the upper and lower semicircular jaws 103 and 105 as well as the general shape of the connector 101.

Referring to Figure 12, a second embodiment of the connector of the instant invention illustrates a connector 151 made of two-piece construction. The portion of material which formed the flange 109 of connector 101 of Figures 7-10 is now physically separated by a joint 153 which encircles the boundary between the outer piece 155 and the inner piece 157. The joint 153 is formed at the junction of an outwardly disposed land

158 on inner piece 157, with an inwardly disposed land 159 on outer piece 155.

The outer piece 155 is made up of the structures including upper and lower semicircular jaws 161 and 163, upper and lower teeth 165, raised linear bumps 167 and 169, on upper and lower levers 171 and 173. The inner piece 157 is made up of the structures, including a forwardly disposed elongated snout 175, having a beveled portion 177, an axially smaller portion 179, and a bore 181; a rearwardly disposed circular fitting 183 having a frusto-conical surface 185 and a reduced outer diameter surface 187.

Referring to Figure 13, a third embodiment of the connector of the instant invention illustrates a connector 201 made of four-piece construction. Here, an inner portion 203 is similar to the inner portion 157 of Figure 12, and includes a forwardly disposed elongated snout 205, having a beveled portion 207, an axially smaller portion 209, and a bore 211; a rearwardly disposed circular fitting 213 having a frusto-conical surface 215 and a reduced outer diameter surface 217.

In the connector 201 of Figure 13, the structures surrounding inner portion 203 are completely separated. An upper member 221, includes the upper semicircular jaw 223 upper teeth 225, upper lever 227 and raised linear bump 229. A lower member 231, includes the lower semicircular jaw 233 lower teeth 235, lower lever 237 and lower raised linear bump 239.

A linear joint 241 on an upper flange 242 separates upper member 221 from inner portion 203, while a linear joint 243 on a lower flange 244 separates lower member 231 from inner portion 203. Linear joints 241 and 243 extending from one side of connector 201 to the

other. Upper and lower members 221 and 231 are urged into contact with inner portion 203 by an elastic member 245. Elastic member 245 encircles the connector 201 within a plane adjacent the plane in which the joints 241 and 243 lie. This slight offset enables elastic member 245 to urge the jaws 223 and 233 together. The upper and lower members 221 and 231 pivotally bear against the inner portion 203 at the joints 241 and 243.

Referring to Figure 14, a fourth embodiment of the connector of the present invention is illustrated as a two-piece connector 251. The body portion is similar to the first embodiment of Figures 7-11, but an elastic slip ring has been provided for locking the connector 251 in either the open or closed positions. Structures of Figure 14 which are similar to those of Figures 7-11 include an upper semicircular jaw 253, opposing a lower semicircular jaw 255 and an elongated snout 257 between the jaws 253 and 255. Upper and lower semicircular jaws 253 and 255, and elongated snout 257 are supported by and extend from a flange 259. A bore 261 extends completely through the connector 251. An upper and lower raised linear bump 263 and 265 are supported by an upper and lower levers 267 and 269, respectively.

Connector 251 has a rearwardly projecting circular fitting 271 having a circular inner surface 273. A series of teeth 277 are located on the mutually opposing circumferentially inwardly oriented surfaces of upper and lower semicircular jaws 253 and 255. Similar to the embodiment of Figures 7-11, the material of connector 251 should be flexible enough that the upper and lower levers 267 and 269 may be flexibly pressed together. However, the material should not be so flexible that when upper and lower levers 267 and 269 are to be flexibly pressed together that the upper and lower semicircular jaws 253 and 255 fail to move angularly away

from each other.

Into the upper and lower surface of the upper and lower semicircular jaws 253 and 255, respectively, is formed a first circular groove 281. Similarly, into the upper and lower surface of the upper and lower levers 267 and 269, is formed a second circular groove 283.

An elastic ring 285 is illustrated resting within first circular groove 281. When elastic ring 285 rests within first circular groove 281, the upper and lower semicircular jaws 253 and 255 are forcibly urged toward each other to form the closed position for connector 251. When elastic ring 285 rests within second circular groove 283, as is shown in phantom, the upper and lower levers 267 and 269 are flexibly pressed together causing the upper and lower semicircular jaws 253 and 255 to be urged away from each other to form the open position for connector 251.

Manual manipulation of the elastic ring 285 along the connector 251 is facilitated by ribs 287 which encircle the outer surface of the elastic ring 285. The ribs 287 provide a better grip for the fingers as the elastic ring 285 is urged axially forward or backward.

Referring to Figure 14a, a cross-sectional view of tube 33 taken along line 14a-14a of Figure 1 illustrates an alternative internal configuration which has a somewhat petal shaped void 289. When a non-smooth internal bore is utilized for tube 33, an alternative connection method such as that shown in conjunction with Figure 14 is needed. Note, that the cross-sectional view of tube 33 also illustrates a smooth circular outer surface 291. The circular inner surface 273 of circular fitting 271 engages the smooth circular outer surface 291

of tube 33 to form a good fit with two-piece connector 251.

The petal shaped void 289 contributes to the more efficient movement of liquids through tube 33. The petal shaped void 289 makes it difficult to block the passage of flow, even in the case where the tube is sharply bent or kinked. It is understood, of course, that tube 33 may be smooth both with regard to its internal bore surface and its circular outer surface 291.

In Figure 15, the connector 101 of Figures 7-11 is shown connected to a tube 33. Note, that the end of tube 33 is slipped over the reduced outer diameter surface 122, frusto-conical surface 121, of circular fitting 119. Figure 15 illustrates the upper lever 123 and lower level 125 in inwardly flexed positions, causing the upper semicircular jaw 103 and the lower semicircular jaw 105 to be urged away from the extended snout 107. In this manner, the connector 101 can be manipulated to urge the upper and lower semicircular jaws 103 and 105 open. Note, that the tube 33 is amenable to some flexing and compression from the upper lever 123 and the lower level 125. The ability of the tube 33 to flex assists in manipulation of the connector 101.

In Figure 16, the pad 21 of Figures 1-5 is connected to tube 33 by means of the connector 101 of Figures 7-11. The semicircular jaws 103 and 105 grasp the perforated tube 59 along with the layer of non-wetting permeable material 25 which lies at both the top and bottom of the absorptive pad 21 as it envelops the pad 21. The first and second layers of wicking material 55 and 57 may be located somewhat back from the end of perforated tube 59 depending upon the manufacturing method utilized. The connector 101 is adapted to grasp

more than perforated tube 59, including the wicking material 55 and 57.

Note, especially the use of the elongated snout 107 to internally cover the apertures 61 and 63 occurring near the end of perforated tube 59 which is to be engaged by connector 101. This ensures that the perforated tube 59 need not be made in a custom fashion with each one of the tubes 59 needing a length of non-aperture perforated tubing on perforated tube 59 for connection with the connector 101. With mass production, the apertures 61 and 63 will occur at randomly differing lengths from the end of the perforated tube 59. However, the length of snout 107 ensures that any exposed apertures 61 and 63 occurring significantly near the end of pad 21 will be covered. This is especially needed when the wick tube assembly 53 does not extend to the end of the pad 21. With the current connector 101 and pad 21, the only apertures 61 and 63 available for aspiration are those further within the volume of the pad 21, and adjacent first and second layers of wicking material 55 and 57.

A fifth embodiment of the connector of the present invention is a two-piece connector 301 embodying an ejection mechanism. The ejection mechanism enables a urine soaked pad 21 to be removed by handling the tube 33 and connector 31 shown in Figure 1. Referring to Figure 17, connector 301 has a cylindrical housing 303 having a small forward aperture 305 and an internal bore 307. A circular inwardly disposed land 309 extends from the surface of the internal bore 307 at the end of cylindrical housing 303 opposite the forward aperture 305.

Internal to the cylindrical housing 303 an internal member 311, having a bore 312, defines an elongate tapering snout 313, an external land 315 which

slidably engages the internal bore 307 of cylindrical housing 303, and circular fitting 317 having a frusto-conical surface 319 and reduced outer diameter surface 321.

Internal member 311 is axially slidable within cylindrical housing 303, the areas of contact between the external land 315 and the internal bore 307, and between the small forward aperture 305 and the elongate tapering snout 313 providing axial stability. The internal surface of tube 33 is securely attached over the circular fitting 317, frusto-conical surface 319, and reduced outer diameter surface 321. Internal member 311 may be axially slid toward small forward aperture 305 to provide maximal extension of the elongate tapering snout 313 outside of the cylindrical housing 303. The firmness of the connection between the internal member 311 and the tube 33 will be sufficiently strong as to permit the internal member 311 to be axially manipulated by axially manipulating the tube 33.

Connector 301 may be assembled at its point of use, as is illustrated in Figure 18. The internal member 311, available separately from the cylindrical housing 303 is first fitted with the tube 33 over its circular fitting 317, frusto-conical surface 319, and reduced outer diameter surface 321. By making the internal member 311 available separately, it is somewhat easier to fit the tube 33 onto the internal member 311. The end of tube 33 is pushed fully toward the external land 315 which assists in sealing the end of tube 33. Figure 19 illustrates the tube 33 in fully fitted position and against the external land 315.

Referring to Figure 20, the internal member 311 is in position for insertion into the cylindrical housing 303. The edge of external land 315 of internal member

311 facing the circular inwardly disposed land 309 is rounded off, to facilitate the snap assembly of the internal member 311 past inwardly disposed land 309. The opposite edge of external land 315 is sharply terminated to prevent its movement past circular inwardly disposed land 309 and out of cylindrical housing 303.

Depending upon the length of elongate tapering snout 313, or conversely, cylindrical housing 303, the end of elongate tapering snout 313 may have to be aligned with small forward aperture 305 before or after the external land 315 clears the circular inwardly disposed land 309. In any event, the elongate tapering snout 313 must extend far enough outside the boundary of cylindrical housing 303 to be effective. Figure 21 illustrates the connector 301 just after the snap fit insertion of the external land 315 past circular inwardly disposed land 309.

Referring to Figure 22, the connector 301 is illustrated in a position to connect with the perforated tube 59 of wick tube assembly 53. The generally upper aperture 61 and generally lower aperture 63 of perforated tube 59 are sealably engaged by a portion of the elongate tapering snout 313. The taper of elongate tapering snout 313 is, such as to allow easy insertion of the end of the elongate tapering snout 313 into the end of the perforated tube 59, and yet begin forming a seal with the internal surface of the perforated tube 59 once the end of the elongate tapering snout 313 is inserted about one-third of the way into the end of the perforated tube 59. The angle of taper and length of elongate tapering snout 313 may be adjusted depending upon the spacing of the generally upper aperture 61 and generally lower aperture 63 of perforated tube 59, and the distance from the open end of perforated tube 59 at which the wick tube assembly 53 begins. The other structures of pad 21 are numbered

as per their appearance in the earlier figures.

To attach a pad 21, as is shown in Figure 22, the tube 33 is grasped in conjunction with the housing 303 to ensure that axial pressure on the elongate tapering snout 313 will not cause it to recede back into the housing 303. The dry pad is grasped with the other hand and pushed toward the elongate tapering snout 313 while the end of perforated tube 59 is axially slid over the elongate tapering snout 313, and until the end of perforated tube 59 abuts the exterior of the housing 303. At this point the pad 21 is fully connected to connector 301 and tube 33.

Figures 23 and 24 illustrate in sequence the ejection of a spent pad 21. Using the tube 33 and connector 301, the urine soaked pad 21 is lifted away from contact with the patient. The connector 301 with tube 33 and urine soaked pad 21 is positioned over a waste container. The connector 301 is grasped with one hand, while a section of the tube 33 adjacent the connector 301 is grasped with the other hand. The tube 33 is pulled axially away from the connector 301 causing the elongate tapering snout 313 to be withdrawn inside the housing 303. The end of the perforated tube 33 cannot be drawn inside the housing 303 since the diameter of the small forward aperture 305 is significantly smaller than the external diameter of the perforated tube 59. The elongate tapering snout 313 is then withdrawn from the end of the perforated tube 59 and into housing 303, as is shown in Figures 23 and 24, causing the urine soaked pad 21 to fall away into the waste container. In this manner, the attendant need not touch the urine soaked pad 21, and may dispose of same without exposure to an unsanitary object.

Referring to Figure 25, a sixth embodiment of the connector of the present invention is illustrated as a connector 351. Connector 351 has an outer housing 353, including an upper semicircular jaw 355, lower semicircular jaw 357, flange 359, upper lever 361 lower lever 363, raised linear bump 365 raised linear bump 367, and teeth 369 on both the upper and lower semicircular jaws 355 and 357. A bore 370 is located at the center of flange 359.

An inner member 371 has a bore 372 extending therethrough, and includes an elongate tapering snout 373, a raised land 375 which may be continuous or discontinuous carried near the tip of the elongate tapering snout 373, circular fitting 377, frusto-conical surface 379, and a reduced outer diameter surface 381. The circular fitting 377 may be fitted with the tube 33 before or after the insertion of the inner member 371 into the outer housing 353. Inner member 371 is fitted into bore 370 of flange 359 by a snap fit. The snap fit is performed by forcing raised land 375 through the bore 370. Preferably bore 370 and raised land 375 may have tapering surfaces to facilitate their snap through fit. Once the raised land 375 is fitted past bore 370, bore 370 acts to prevent removal of the inner member 371 from the outer housing 353.

Figure 26 illustrates the connector 351 in a position to be connected to the absorbent pad 21. The tube 33 is axially moved toward the outer housing 353 to cause the elongate tapering snout 373 to be as fully as possible extended forwardly through outer housing 353, for its insertion into the internal area of perforated tube 59. Then, the upper and lower levers 361 and 363 are pressed together to open the upper and lower semicircular jaws 355 and 357.

The end of absorbent pad 21 and the perforated tube 59 is then positioned axially with respect to elongate tapering snout 373 and elongate tapering snout 373 is inserted into the end of perforated tube 59. The upper and lower semicircular jaws 355 and 357 are released after the elongate tapering snout 373 is fully inserted into the end of perforated tube 59. This causes the upper and lower semicircular jaws 355 and 357 to close down upon the exterior of absorbent pad 21 to more firmly hold the connector 351 in place.

Figures 27 and 28 illustrate in sequence the ejection of a spent absorbent pad 21 using connector 351. Using the tube 33 and connector 351, the urine soaked pad 21 is lifted away from contact with the patient. The connector 351 with tube 33 and urine soaked pad 21 is positioned over a waste container. The upper and lower levers 361 and 363 of connector 351 are grasped with one hand, and depressed to open the upper and lower semicircular jaws 355 and 357, while a section of the tube 33 adjacent the connector 351 is grasped with the other hand. The tube 33 is pulled axially away from the connector 351 causing the elongate tapering snout 373 to be withdrawn towards the outer housing 353. The end of the perforated tube 33 cannot be drawn beyond the flange 359 since the diameter of the bore 370 is significantly smaller than the external diameter of the perforated tube 59. The elongate tapering snout 373 is then withdrawn from the end of the perforated tube 59 and into the rear portion of outer housing 353, as is shown in Figures 27 and 28, causing the urine soaked pad 21 to fall away into the waste container. Again, in this manner, the attendant need not touch the urine soaked pad 21, and may dispose of same without exposure to an unsanitary object.

Referring to Figure 29, a seventh embodiment of the connector of the present invention is illustrated as

a connector 401. This two-piece connector 401 is similar to the two-piece connector 301 which was shown in Figures 17-25. Again, this ejection mechanism enables a urine soaked pad 21 to be removed by handling the tube 33 and connector 31 shown in Figure 1. Referring to Figure 29, connector 401 has a cylindrical housing 403 having a small forward aperture 405 and an internal bore 407.

Internal to the cylindrical housing 403 an internal member 411 has a bore 412 extending therethrough, and defines an elongate tapering snout 413, a small external land 415 located near the tip end of elongate tapering snout 413 which slidably engages the front portion of the cylindrical housing 403 through internal bore 407 of cylindrical housing 403. Internal member 411 also has a regular external land 416 which contacts the internal bore 407 of cylindrical housing 403. Internal member 411 also has a circular fitting 417 having a frusto-conical surface 419 and reduced outer diameter surface 421.

Internal member 411 is axially slidable within cylindrical housing 403, the areas of contact between the regular external land 416 and the internal bore 407, and between the small forward aperture 405 and the elongate tapering snout 413 providing axial stability. The internal surface of tube 33 is securely attached over the circular fitting 417, frusto-conical surface 419, and reduced outer diameter surface 421. Internal member 411 may be axially slid toward small forward aperture 405 to provide maximal extension of the elongate tapering snout 413 outside of the cylindrical housing 403. The firmness of the connection between the internal member 411 and the tube 33 will be sufficiently strong as to permit the internal member 411 to be axially manipulated by axially manipulating the tube 33.

Connector 401 may be assembled at its point of use, as was the case for connector 301 of Figure 18. The internal member 411, available separately from the cylindrical housing 403 is first fitted with the tube 33 over its circular fitting 417, frusto-conical surface 419, and reduced outer diameter surface 421. By making the internal member 411 available separately, it is somewhat easier to fit the tube 33 onto the internal member 411. The end of tube 33 is pushed fully toward the external land 415 which assists in sealing the end of tube 33. The internal member 411 is placed in position for insertion into the cylindrical housing 403.

The tip end of the elongate tapering snout 413 is guided through the small forward aperture 405 until the edge of small external land 415 of internal member 411 meets the portion of the cylindrical housing 403 immediately surrounding the small forward aperture 405. The small external land 415 is then forced through the small forward aperture 405 in a snap fit fashion. Preferably, the outer surfaces of the small external land 415 and the internal surfaces of the small forward aperture may contain complimentary tapers to facilitate their snap fit.

Once the small external land 415 passes through the small forward aperture 405, the internal member 411 will not be separable from the cylindrical housing 403. Once assembled, the elongate tapering snout 413 must extend far enough outside the boundary of cylindrical housing 403 to be effective.

Referring to Figure 30, the connector 401 is illustrated in a position to connect with the perforated tube 59 of wick tube assembly 53. The generally upper aperture 61 and generally lower aperture 63 of perforated tube 59 are sealably engaged by a portion of the elongate

tapering snout 413. The taper of elongate tapering snout 413 is, such as to allow easy insertion of the end of the elongate tapering snout 413 into the end of the perforated tube 59, and yet begin forming a seal with the internal surface of the perforated tube 59 once the end of the elongate tapering snout 413 is inserted about 1/3 of the way into the end of the perforated tube 59. The angle of taper and length of elongate tapering snout 413 may be adjusted depending upon the spacing of the generally upper aperture 61 and generally lower aperture 63 of perforated tube 59, and the distance from the open end of perforated tube 59 at which the wick tube assembly 53 begins. The other structures of pad 21 are numbered as per their appearance in Figure 29.

To attach a pad 21, as is shown in Figure 31, the tube 33 is grasped in conjunction with the housing 403 to ensure that axial pressure on the elongate tapering snout 413 will not cause it to recede back into the cylindrical housing 403. The dry pad 21 is grasped with the other hand and pushed toward the elongate tapering snout 413 while the end of perforated tube 59 is axially slid over the elongate tapering snout 413, and until the end of perforated tube 59 abuts the exterior of the housing 403. At this point the absorbent pad 21 is fully connected to connector 401 and tube 33.

Figures 31 and 32 illustrate in sequence the ejection of a spent pad 21. Using the tube 33 and connector 401, the urine soaked pad 21 is lifted away from contact with the patient. The connector 401 with tube 33 and urine soaked pad 21 is positioned over a waste container. The connector 401 is grasped with one hand, while a section of the tube 33 adjacent the connector 401 is grasped with the other hand. The tube 33 is pulled axially away from the connector 301 causing the elongate tapering snout 413 to be withdrawn inside

the cylindrical housing 403. The end of the perforated tube 33 cannot be drawn inside the housing 403 since the diameter of the small forward aperture 405 is significantly smaller than the external diameter of the perforated tube 59. The elongate tapering snout 413 is then withdrawn from the end of the perforated tube 59 and into housing 403, as is shown in Figures 31 and 32, causing the urine soaked pad 21 to fall away into the waste container. Again, the attendant need not touch the urine soaked pad 21 and may dispose of same without exposure to an unsanitary object.

The operation of the improved pad and tube of the present invention is described with respect to connector 101, the operation and structure of connectors 101, 151, 201, 251, 301, 351 and 401 having been discussed in some detail. The absorbent pad 21 of Figure 1 is placed near the urethral opening of the patient, especially a female patient whose urinary incontinence is to be managed. The non-sticking tear-away strip 45 may be removed from the adhesive layer 73, if the absorbent pad 21 is to be positioned against the patient and further secured with clothing or any other device having an appropriate inwardly disposed surface.

Circular fitting 119 of connector 101 is fitted to tube 33 leading to the urine collection reservoir 35. Typically, once connector 101 is connected to tube 33, it need not be removed thereafter during the normal course of usage. The upper and lower levers 125 and 127 of connector 101 are then pressed together to cause the upper and lower semicircular jaws 103 and 105 to open.

The elongated snout 107 of connector 101 is then inserted into the end of perforated tube 59. The upper and lower semicircular jaws 103 and 105 are made to open wide enough so that the upper and lower portions of

the hydroscopic material 25 may be inserted between the jaws 103 and 105. Once the elongated snout 107 and the connector 101 are fully inserted into the tube 59, the upper and lower levers 125 and 127 are released, causing the upper and lower semicircular jaws 103 and 105 to compressably grasp perforated tube 59 and the non-wetting, permeable material 25 inserted between the jaws 103 and 105.

In this configuration, connector 101 is connected to the tube 33. The connector 101 is attached to both the perforated tube 59 and the outer portion of the absorbent pad 21. Such a configuration lessens the opportunity for the perforated tube 59 to be axially pulled from the absorbent pad 21.

Vacuum pump 37 is started and the pressure in both the urine collection reservoir 35 and the tube 33 is lowered. Air within the absorbent pad 21 is drawn into apertures 61 and 63. Urine surrounding perforated tube 59 is thereby drawn into perforated tube 59.

A wicking path is formed for liquid urine to enter the first and second wicking materials 55 and 57 from any point along their surface areas and to be wicked within the planar portions of the wicking materials 55 and 57 in a direction toward perforated tube 59. Once the liquid urine is wicked into the portions of wicking materials 55 and 57 surrounding the perforated tube 59, they are available for entry into perforated tube 59 through the upper and lower apertures 61 and 63.

Liquid urine enters the apertures 61 and 63 due to the reduced pressure within perforated tube 59, reduced with respect to the ambient pressure of the surroundings and the ambient pressure of the urine in the wicking materials 55 and 57 at the opening of the upper

and lower apertures 61 and 63. This pressure differential causes the aspiration action which causes the liquid urine to be aspirated into the perforated tube 59.

Once liquid urine enters perforated tube 59, it flows toward the tube-end 29 of the absorbent pad 21. The fluted void 67A assists in the transfer of the two-phase liquid urine-air flow as it moves through the tube 33. A tube 33 with a smooth profile, may, depending on the orientation of tube 33 with respect to gravity, create aspiration noise, such as gurgling, as the aspirating air becomes intermittently trapped behind blocking masses of liquid. The fluted void helps to provide a partially segregated path for the two-phase liquid urine-air flow, to avoid this problems and enhance flow efficiency.

The improved pad and pad tube connector of the present invention, utilizable with a urine aspiration system having a vacuum pump and collection reservoir, utilizes a perforated tube within the volume of an absorbent pad which is surrounded by a wicking structure which wicks liquid away from the edges of the pad and towards the central perforated tube. The wicking structure frictionally engages the absorbent material forming the predominate volume of the pad to provide greater pad stability.

The improved connector of the present invention engages the centrally located aspiration tube within the pad at a point near the end of the pad. The liquid sealing is performed about a face which has a plane generally perpendicular to the direction of flow. One embodiment of the improved connector engages both the perforated aspiration tube and a portion of the pad material. In this manner, the connector both resists

disconnection from the perforated tube within the pad and resists the application of axial pressure on the perforated tube within the pad, by virtue of its direct connection to the pad.

Additionally, the connector snout is longer than the distance between the open end 29 and the point at which wick tube assembly 53 is encountered. Although the invention has been derived with reference to particular illustrative embodiments thereof, many changes and modifications of the invention may become apparent to those skilled in the art without departing from the spirit and scope of the invention. Therefore, included within the patent warranted hereon are all such changes and modifications as may reasonably and properly be included within the scope of this contribution to the art.

What is claimed is:

1. An absorptive aspiratable pad comprising:

an elongate fluid impermeable lower liner, defining a planar surface forming the bottom and sides of said absorptive aspiratable pad;

a volume of absorbent material supported by and coextensive with said impermeable lower liner;

a first layer of wicking material extending substantially the length of said absorbent material, said first layer of wicking material in contact with said volume of absorbent material;

an elongate tube having a multiplicity of perforations, the axis of the perforations transverse to the axis of said tube, said first layer of wicking material attached to said elongate tube;

a second layer of wicking material attached to said elongate tube and to said first layer of wicking material, said first and second layers of wicking material and said tube forming a wicked tube assembly; and

a layer of essentially non-wetting, permeable material substantially enveloping said lower liner, volume of absorbent material, and said wicked tube assembly.

2. The absorptive pad as recited in Claim 1, wherein said second layer of wicking is substantially coextensive with said first layer of wicking material.

3. The absorptive pad as recited in Claim 2, wherein the predominant area of said first and said second layers of wicking are substantially coextensive with the area of said volume of absorbent material.

4. The absorptive pad as recited in Claim 1, wherein said first and said second layers of wicking are directly attached to substantially the entire perimeter of said tube.

5. The absorptive pad as recited in Claim 2, wherein said first layer of wicking lies substantially in a plane, and wherein said axis of said multiplicity of apertures of said tube are generally perpendicular to the plane of said first layer of wicking.

6. The absorptive pad as recited in Claim 2, wherein second layer of wicking lies substantially in a plane and wherein said axis of multiplicity of apertures of said tube are generally perpendicular to the plane of said second layer of wicking.

7. The absorptive pad as recited in Claim 1, wherein said axis of said multiplicity of apertures of said tube are generally perpendicular to said planar surface of said elongate fluid impermeable lower liner.

8. The absorptive pad as recited in Claim 1, and further comprising an inner layer of highly absorbent material enclosed by said non-wetting permeable layer of material and surroundably enclosing said volume of absorbent pad, and said wicked tube assembly.

9. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies outside of and adjacent said volume of absorbent material opposite said elongate fluid impermeable lower liner.

10. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies outside of and adjacent said volume of absorbent material and adjacent said elongate fluid impermeable lower liner.

11. The absorptive pad as recited in Claim 10 and further comprising an inner layer of highly absorbent material enclosed by said non-wetting, permeable layer of material and surroundably enclosing said volume of absorbent pad.

12. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies substantially within said volume of absorbent material.

13. The absorptive pad as recited in Claim 1, wherein said layer of essentially non-wetting, permeable material completely enveloping said lower liner and said volume of absorbent material, and sealably surrounds said wicked tube assembly.

14. The absorptive pad as recited in Claim 1, wherein said elongate tube is attached near said middle of said first layer of wicking material.

15. A tube connector for an absorptive pad comprising:

a flange having a front side and a rear side;

a pair of opposing jaws continuous with said front side of said flange;

a pair of opposing levers continuous with the rear side of said flange;

an extended snout continuous with the front side of said flange and extending between said pair of opposing jaws;

a circular fitting continuous with the rear side of said flange and extending between said pair of opposing levers.

16. The tube connector of Claim 15 wherein said elongated snout extends farther away from said flange than said pair of opposing jaws tube extends away from said flange.

17. A connectable aspiratable pad as claimed in Claim 1 and further comprising:

a tube connector for an absorptive pad further comprising:

a flange having a front side and a rear side;

a pair of opposing jaws continuous with said front side of said flange;

a pair of opposing levers continuous with the rear side of said flange;

an extended snout continuous with the front side of said flange and extending between said pair of opposing jaws, and inserted into said elongate tube;

a circular fitting continuous with the rear side of said flange and extending between said pair of opposing levers.

and wherein said elongated snout extends sufficiently far into said elongate tube to internally seal any of said multiplicity of perforations not surrounded by at least one of said first and said second layers of wicking material.

18. The tube connector of Claim 15 wherein said pair of opposing levers extends farther away from said flange than said circular fitting extends away from said flange.

19. The tube connector of Claim 15 further comprising a pair of linear bumps, each linear bum continuous with an associated one of said pair of opposing
levers.

20. The tube connector of Claim 15 further comprising a plurality of teeth integral with each one of said pair of opposing jaws, directed toward said extended snout.

21. The tube connector of Claim 15 wherein each one of said pair of opposing jaws is circularly shaped and concave toward said extended snout.

22. The tube connector of Claim 15 wherein said circular fitting has a frusto-conical surface.

23. The tube connector of Claim 22 wherein said circular fitting has a reduced outer diameter surface adjacent a smaller diameter side of said frusto-conical surface.

24. The tube connector of Claim 15 wherein said circular fitting has a circular inner surface.

25. The tube connector of Claim 15 wherein said extended snout has a beveled portion located away from said flange.

26. The tube connector of Claim 25 wherein said extended snout terminates at an axially smaller portion adjacent said beveled portion.

27. The tube connector of Claim 15 wherein said pair of opposing jaws each has an outwardly disposed first groove extending transverse to their length, and wherein said pair of opposing levers each has an outwardly disposed second groove extending transverse to their length, and further comprising an elastic ring slidable along the outside of said connector between and at rest within said first grooves and said second grooves for biasing said connector between an open and closed position.

28. A tube connector for an absorptive pad comprising:

an outer piece further comprising:

a flange having a central aperture, a front side and a rear side;

a pair of opposing jaws continuous with said front side of said flange; and

a pair of opposing levers continuous with the rear side of said flange;

an inner piece further comprising:

an extended snout at one end of said inner piece;

a circular fitting at the other end of said inner piece;

an outwardly disposed land between said extended snout and said circular fitting;

said inner piece fittable within said outer piece, said outwardly disposed land engaging said aperture to form a joint.

29. A tube connector for an absorptive pad comprising:

a first outer piece further comprising:

a first jaw;

a first lever continuous with said first jaw;

a first raised land between said first opposing lever and said first opposing jaw; and

a first groove between said first opposing lever and said first opposing jaw, and opposite said first raised land;

a second outer piece further comprising:

a second jaw;

a second lever continuous with said second jaw;

a second raised land between said second opposing lever and said second opposing jaw; and

a second groove between said second opposing lever and said second opposing jaw, and opposite said second raised land;

a inner piece further comprising:

an extended snout at one end of said inner piece;

a circular fitting at the other end of said inner piece;

an outwardly disposed land between said extended snout and said circular fitting;

said first and said second outer pieces fittable against said inner piece opposite each other, said outwardly disposed land engaging said raised first land and said second raised land of said first and said second outer pieces to form a joint; and

biasing means, engaging said first and said second groove, for urging said first and said second outer pieces into fitting relation with said inner piece.

30. The tube connector of Claim 28 wherein said biasing means is an elastic member.

31. A tube connector for an absorptive pad comprising:

a cylindrical housing having a first end

defining a small open aperture and a second end;

an internal member having a central bore extending therethrough and further comprising:

an elongate tapering snout;

an external land adjacent said elongate tapering snout; and

a circular fitting adjacent said external land;

said elongate tapering snout axially slidably fittable through said small open aperture, and said external land axially slidably fittable within aid cylindrical housing.

32. A tube connector for an absorptive pad as set forth in Claim 31, wherein said second end of said cylindrical housing defines a circular inwardly disposed land engaging said externally disposed land of said internal member and which defines the maximum extent of travel of said inner member in the direction of said second end of said cylindrical housing.

33. A tube connector for an absorptive pad as set forth in Claim 31, wherein the end of said elongate tapering snout opposite said external land defines a small generally circular outwardly disposed land engaging said cylindrical housing adjacent said small open aperture and which defines the maximum extent of travel of said inner member in the direction of said second end of said cylindrical housing.

34. The tube connector of Claim 31 wherein said circular fitting has a frusto-conical surface.

35. The tube connector of Claim 34 wherein said circular fitting has a reduced outer diameter surface adjacent a smaller diameter side of said frusto-conical surface.

36. The tube connector of Claim 31 wherein said circular fitting has a circular inner surface.

37. A tube connector for an absorptive pad comprising:

an outer piece further comprising:

a flange having a front side and a rear side and defining an aperture;

a pair of opposing jaws continuous with said front side of said flange;

a pair of opposing levers continuous with the rear side of said flange;

an inner piece, having a central bore extending therethrough, and further comprising:

an extended snout;

an outwardly disposed circular land adjacent said extended snout; and

a circular fitting adjacent said outwardly disposed circular land; the inner piece fittable within the outer piece such that said circular fitting extends between said pair of opposing levers and said extended snout extends between said pair of opposing jaws.

38. The tube connector of Claim 37 wherein the outermost edge of said outwardly disposed circular land fits snugly within said aperture of said flange.

39. The tube connector of Claim 37 wherein said outwardly disposed circular land is positioned near the end of said elongate snout opposite said circular fitting ,and said elongate snout is axially slidable within said aperture of said flange, its axial movement in one direction limited by the engagement of said outwardly disposed circular land with said flange, and its axial movement in the other direction limited by the engagement of aid circular fitting with said flange.

40. The tube connector of Claim 37 wherein said extended snout is tapered.

41. The tube connector of Claim 37 wherein said pair of opposing jaws each further defines a plurality of inwardly directed teeth.

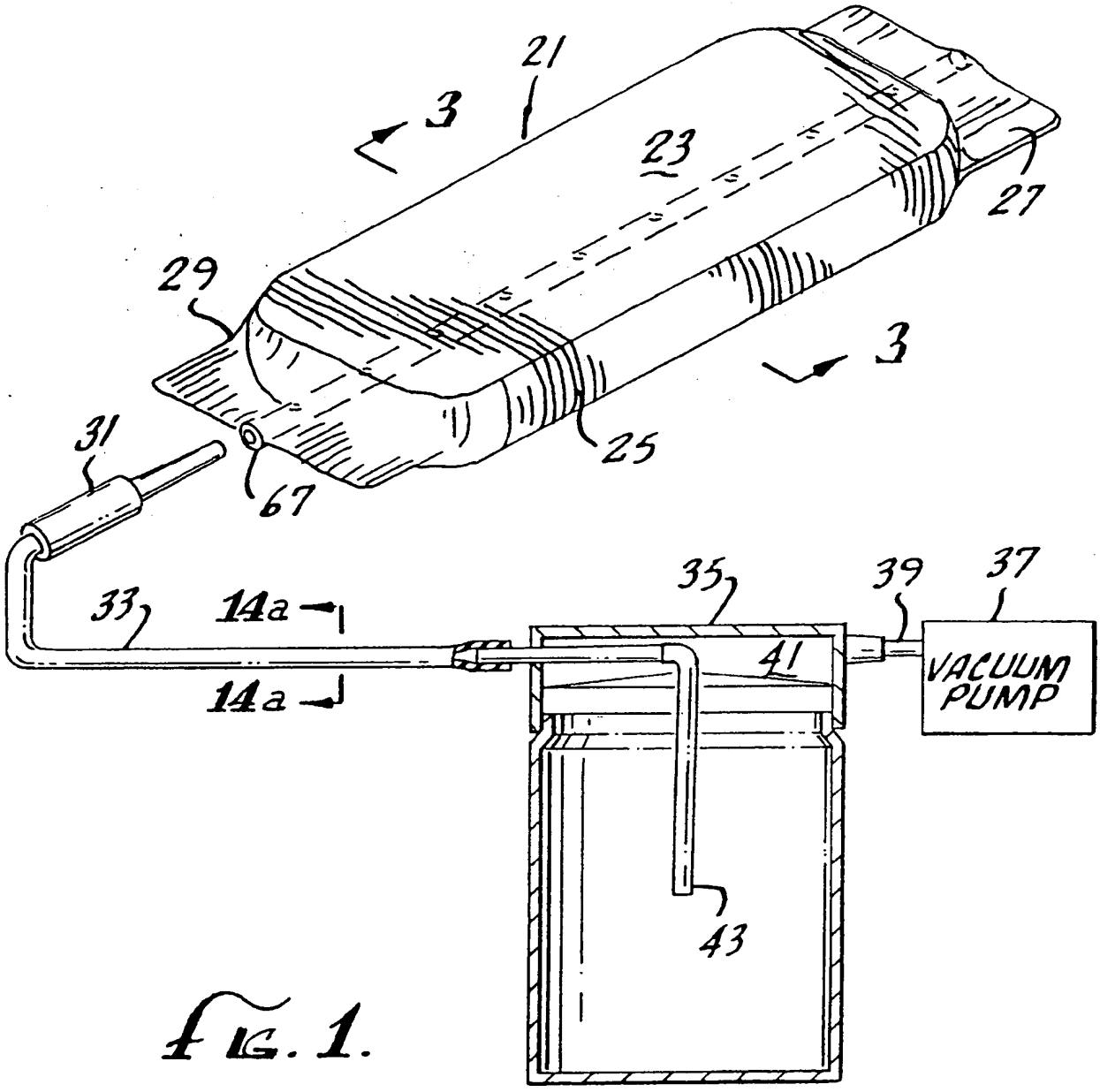

FIG. 1.

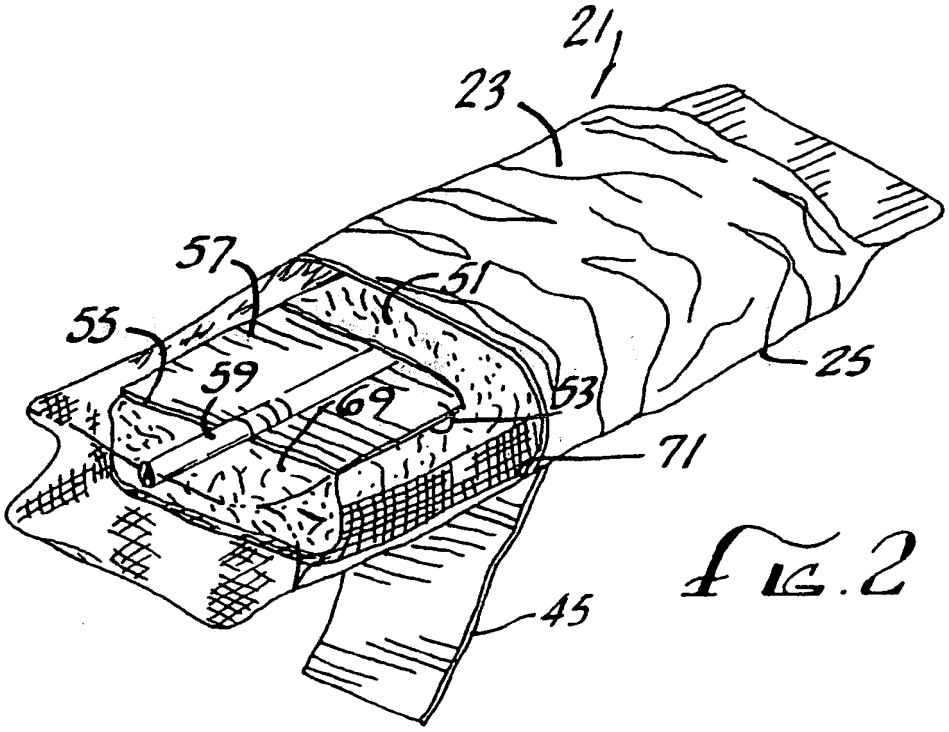

FIG. 2

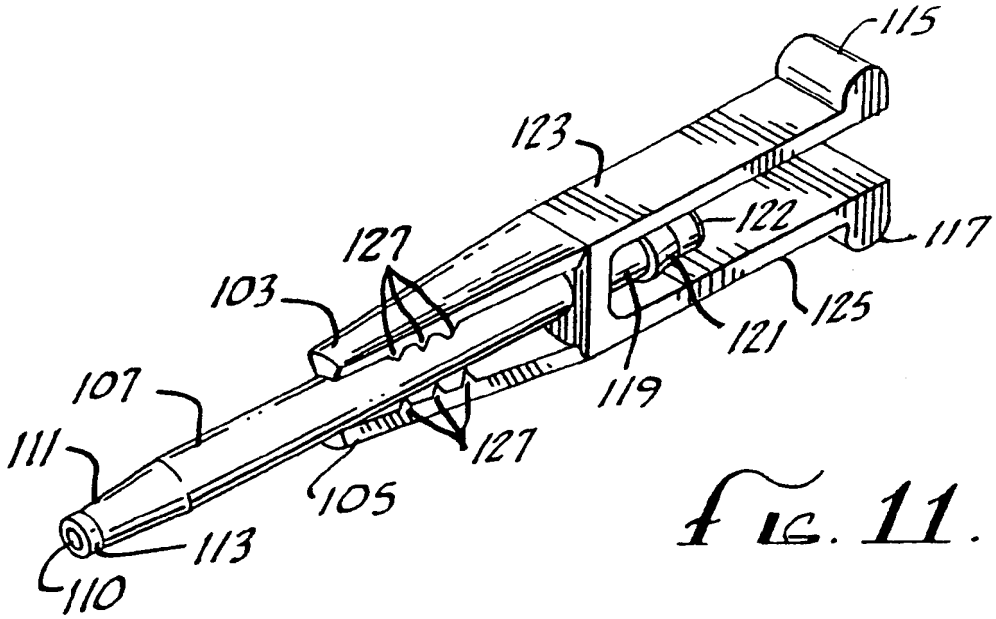

FIG. 11.

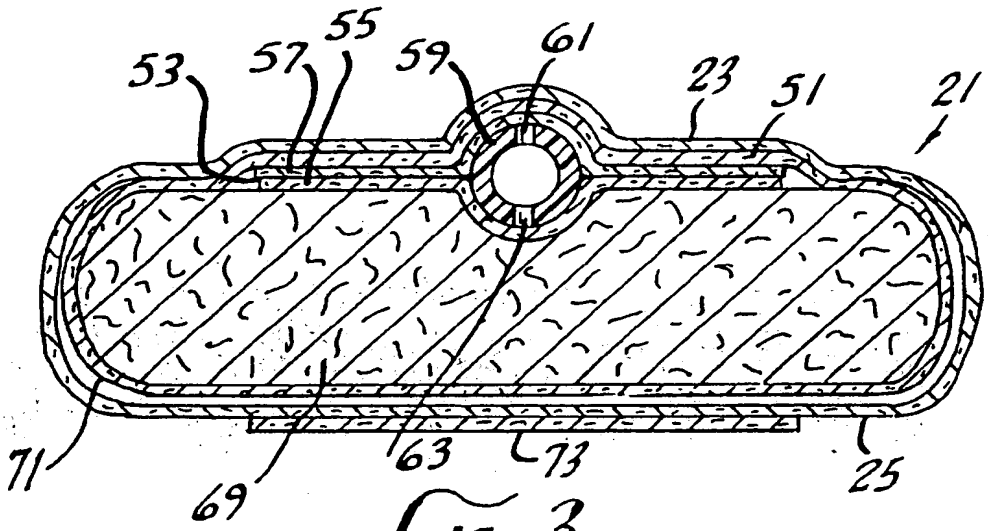

FIG. 3.

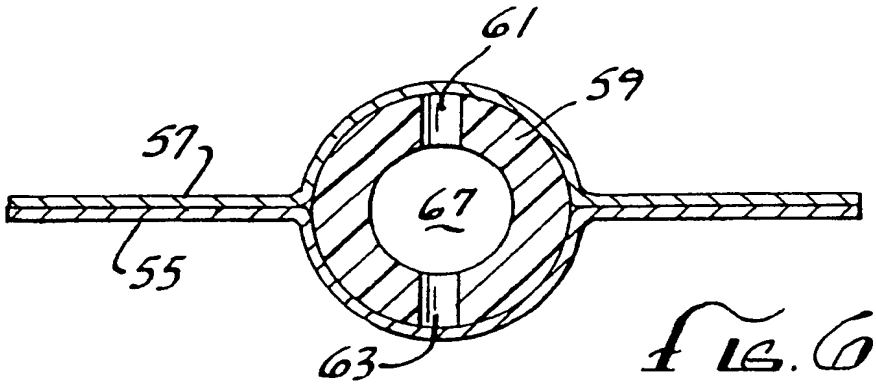

FIG. 6.

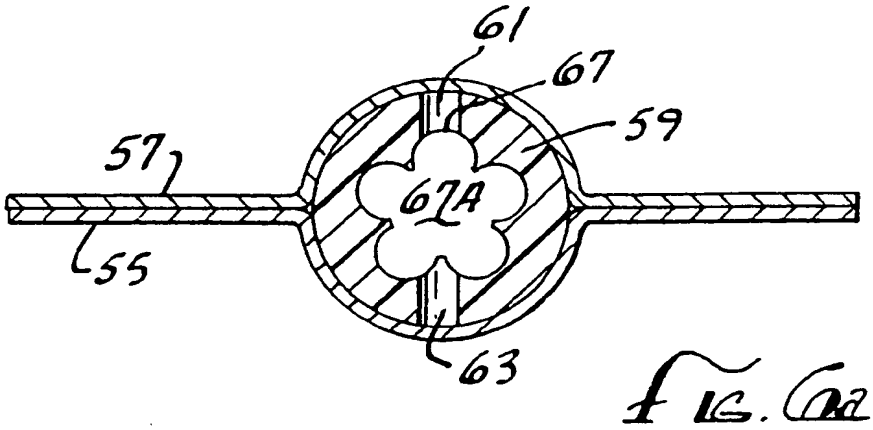

FIG. 6a.

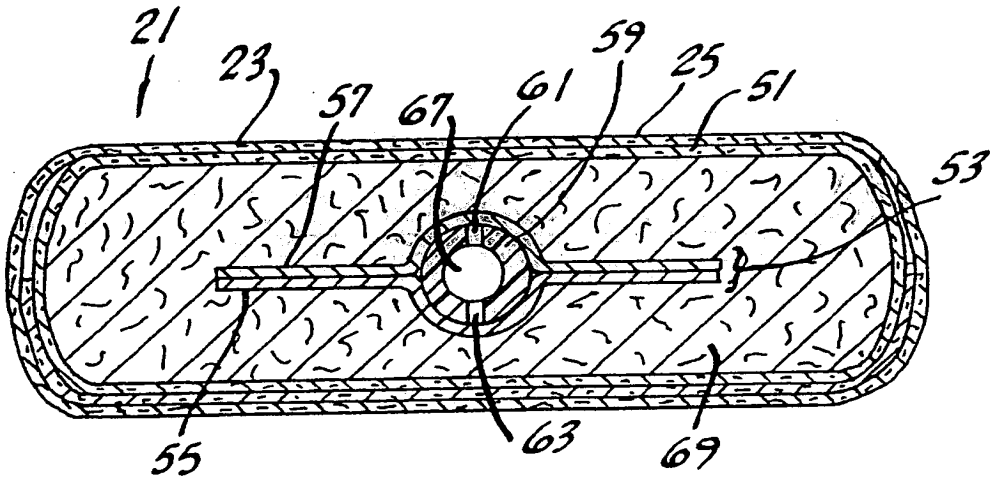

FIG. 4.

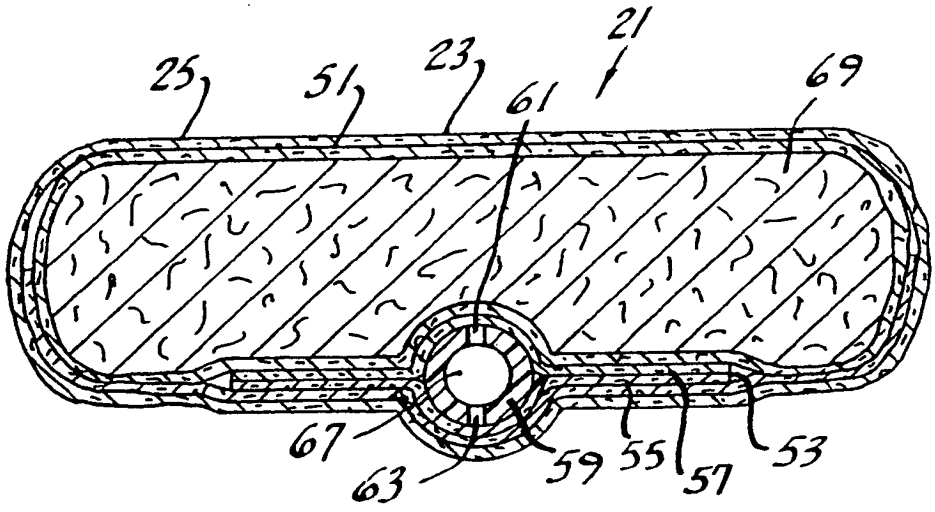

FIG. 5.

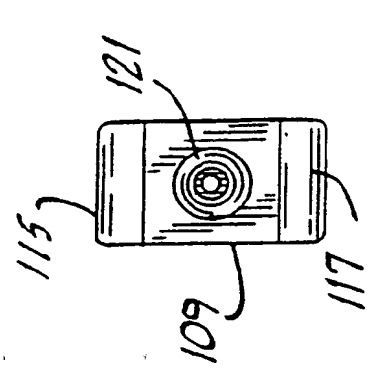

FIG. 10.

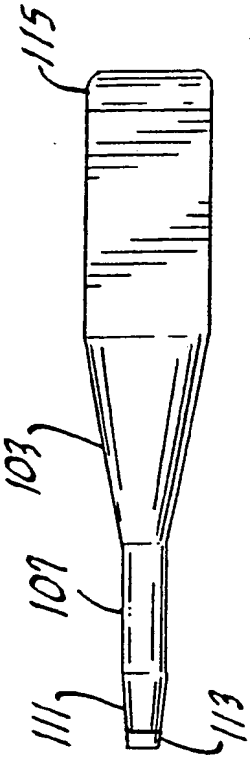

FIG. 8.

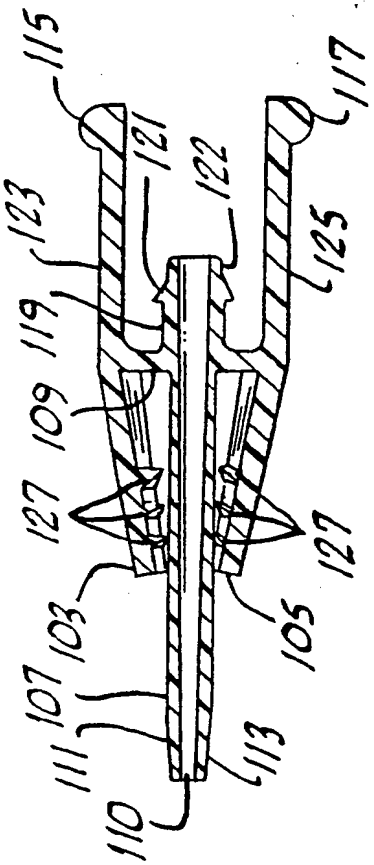

FIG. 9.

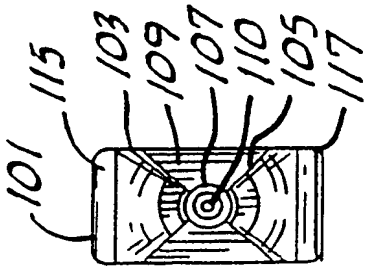

FIG. 7.

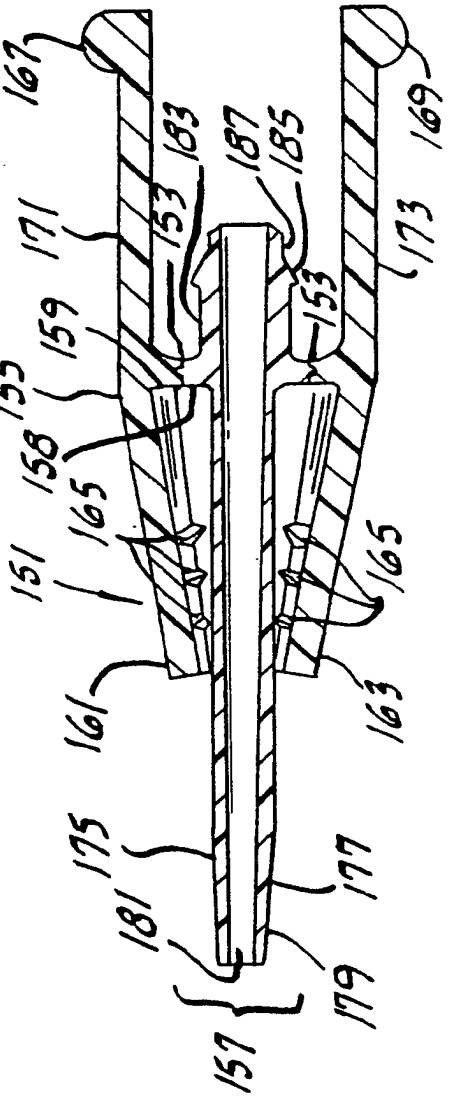

FIG. 12.

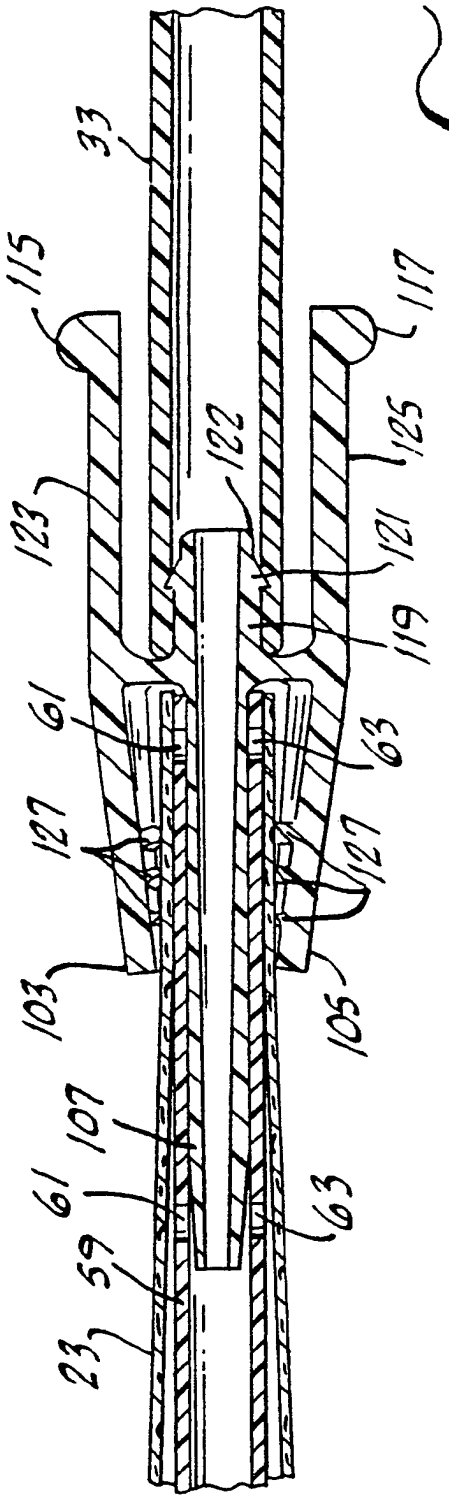

FIG. 16.

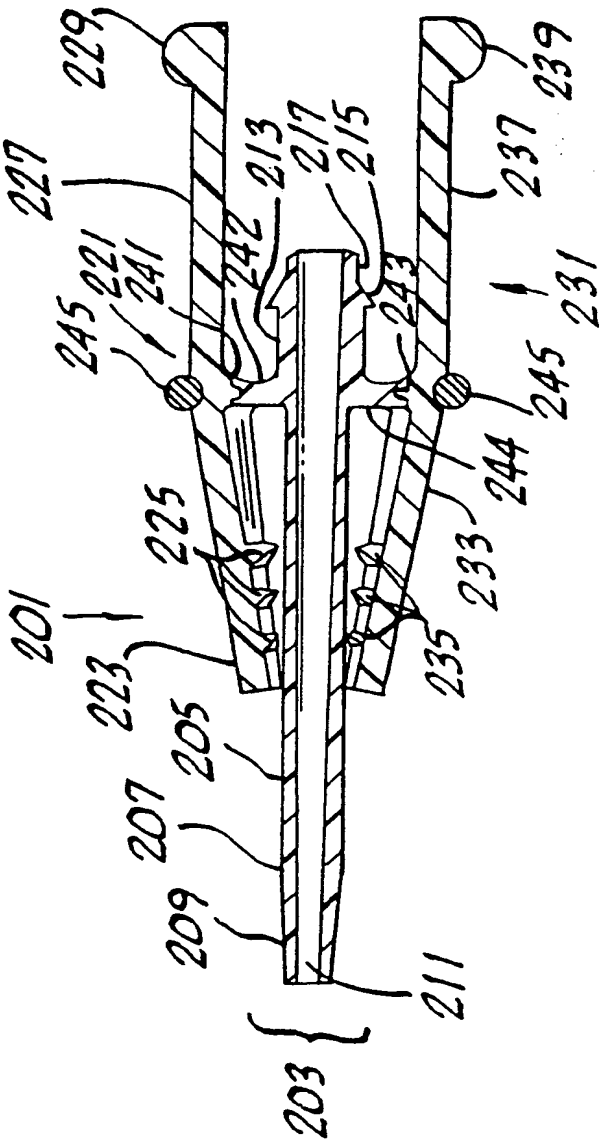

FIG. 13.

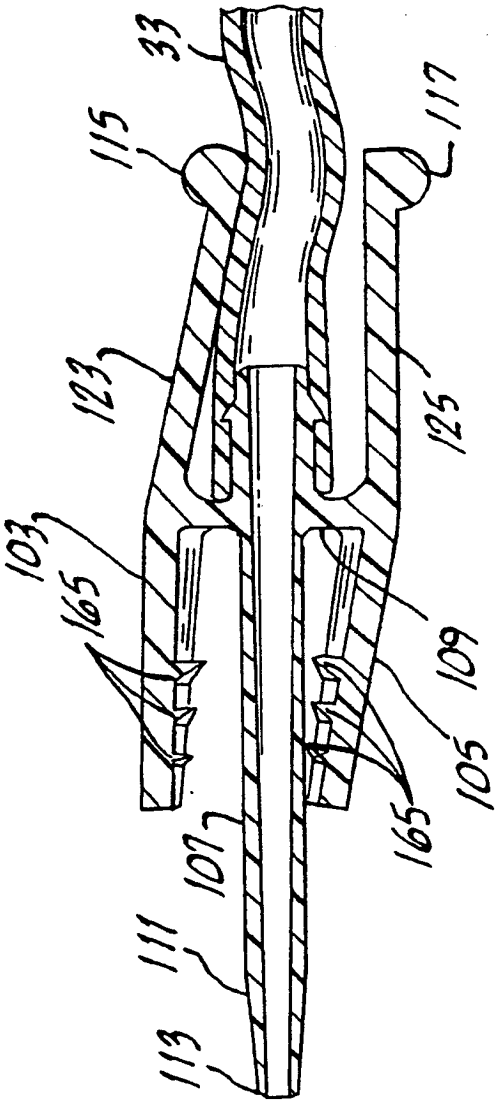

FIG. 15.

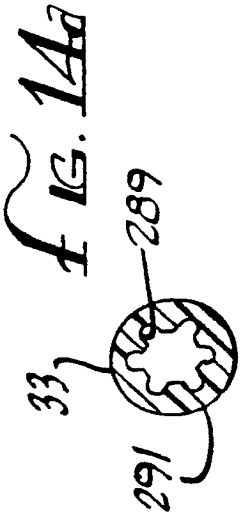

FIG. 14a

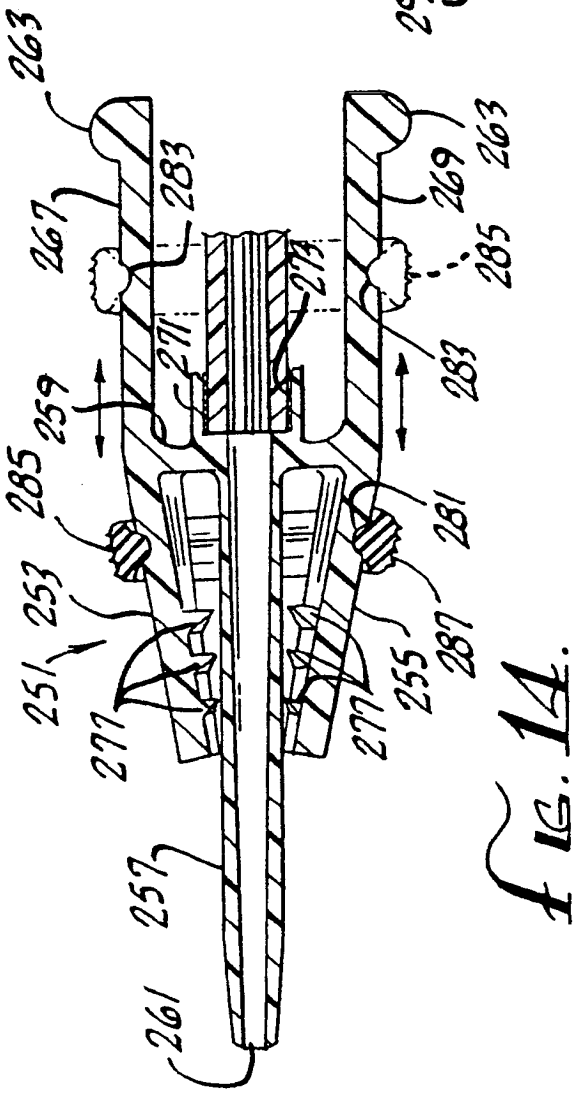

FIG. 14.

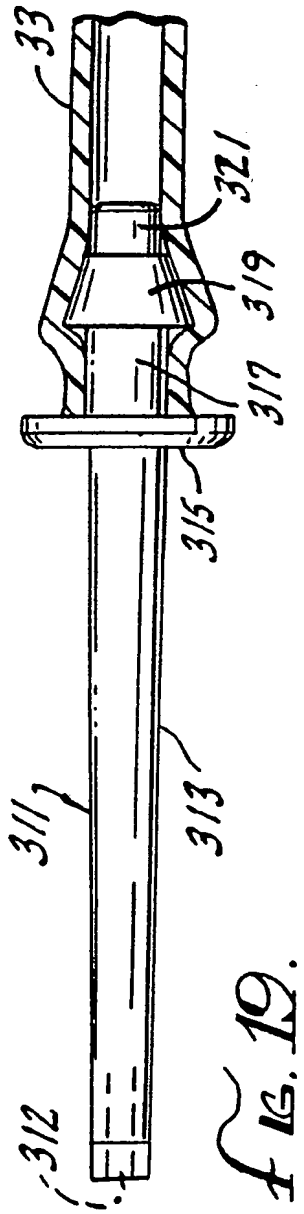

FIG. 19.

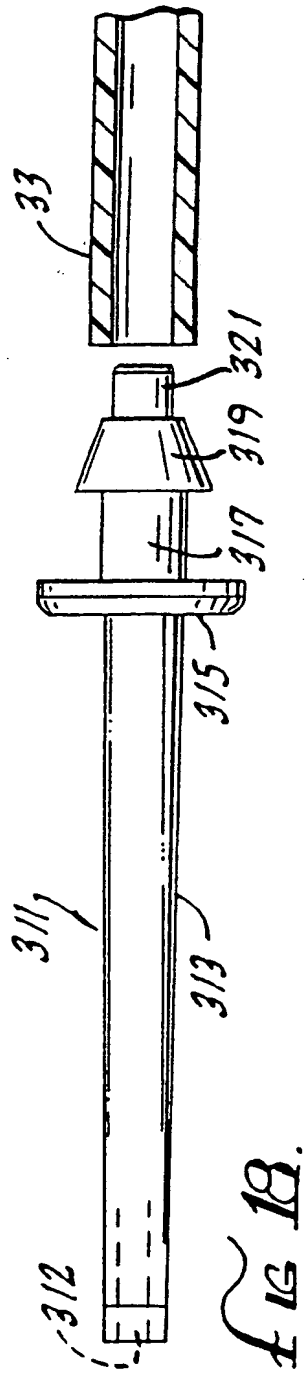

FIG 18.

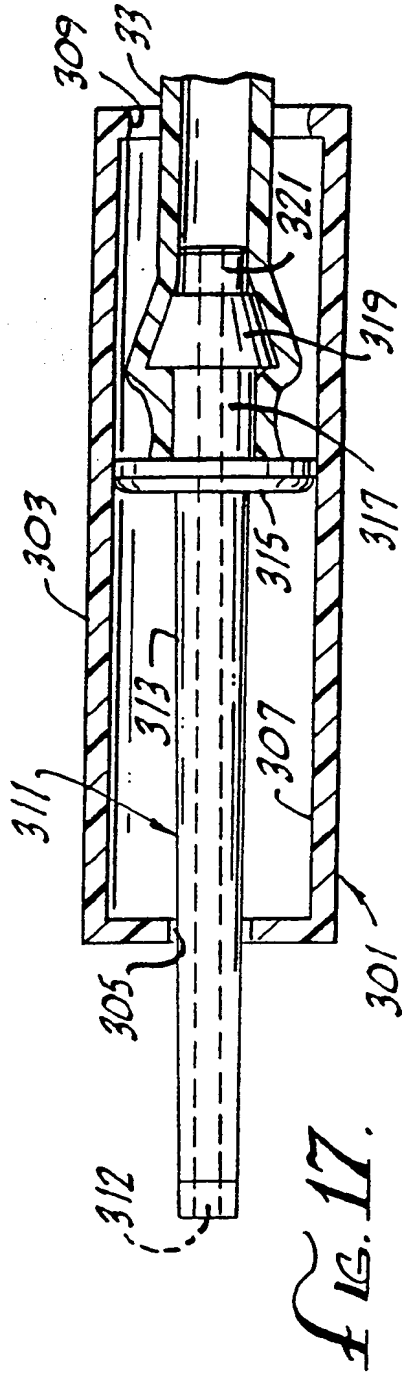

FIG. 17.

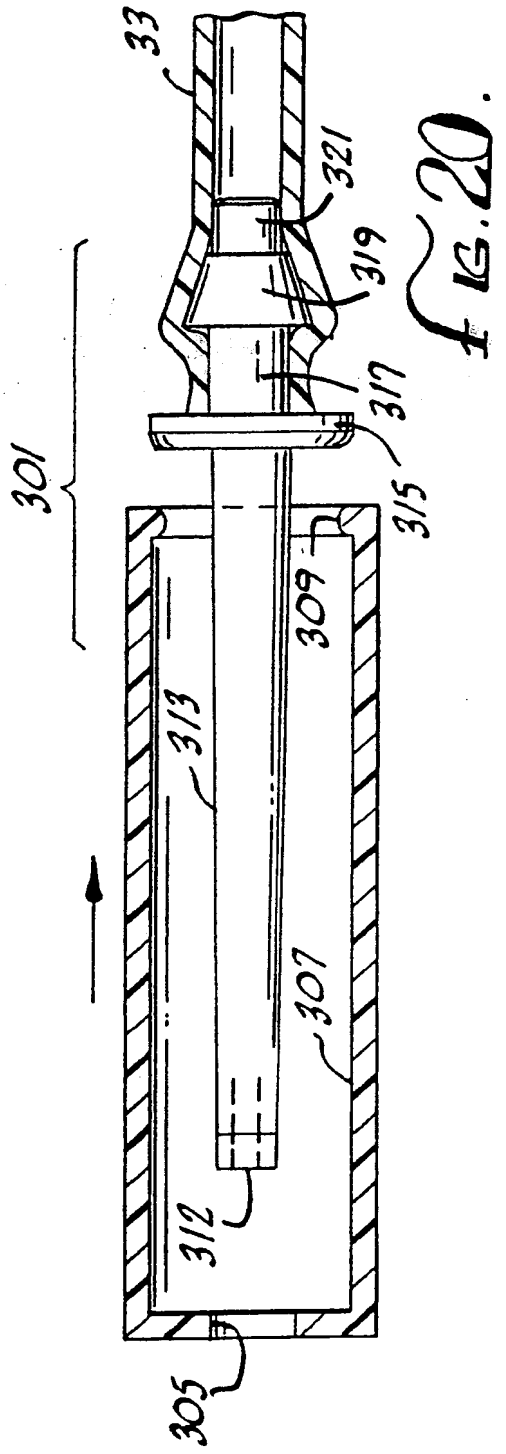

FIG. 20.

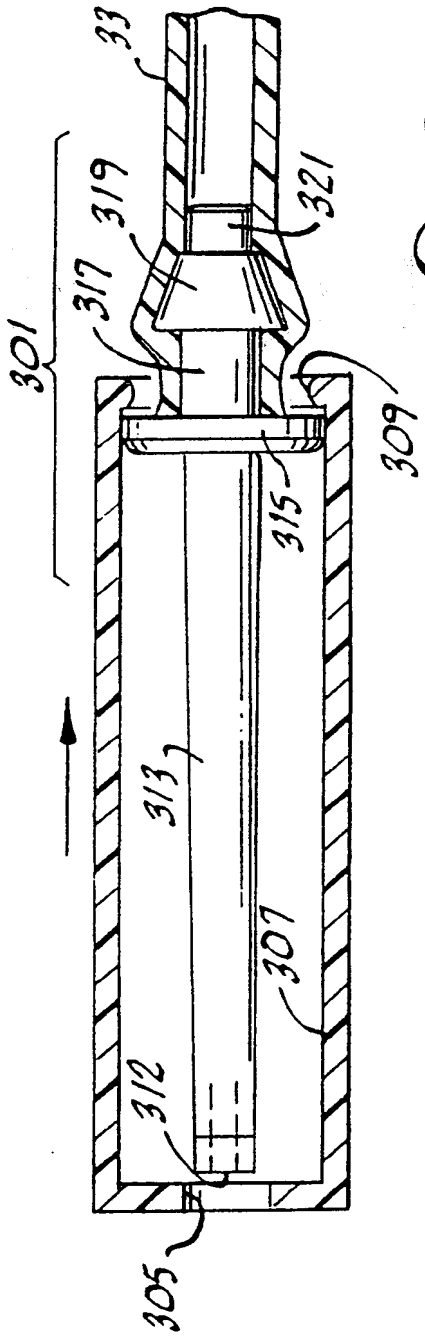

FIG. 21.

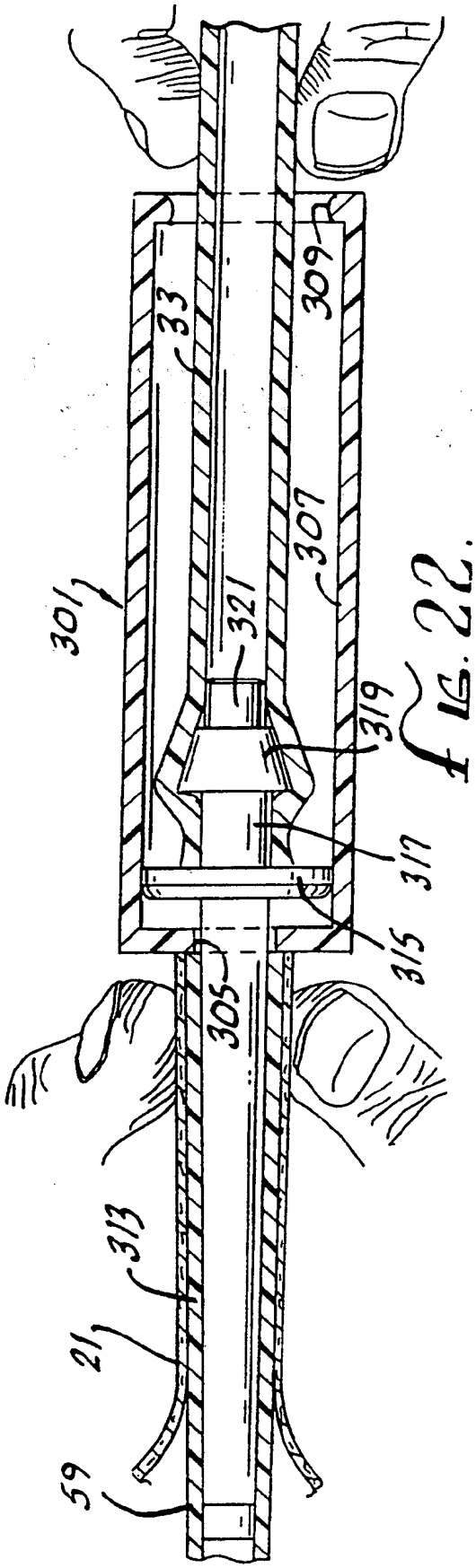

FIG. 22.

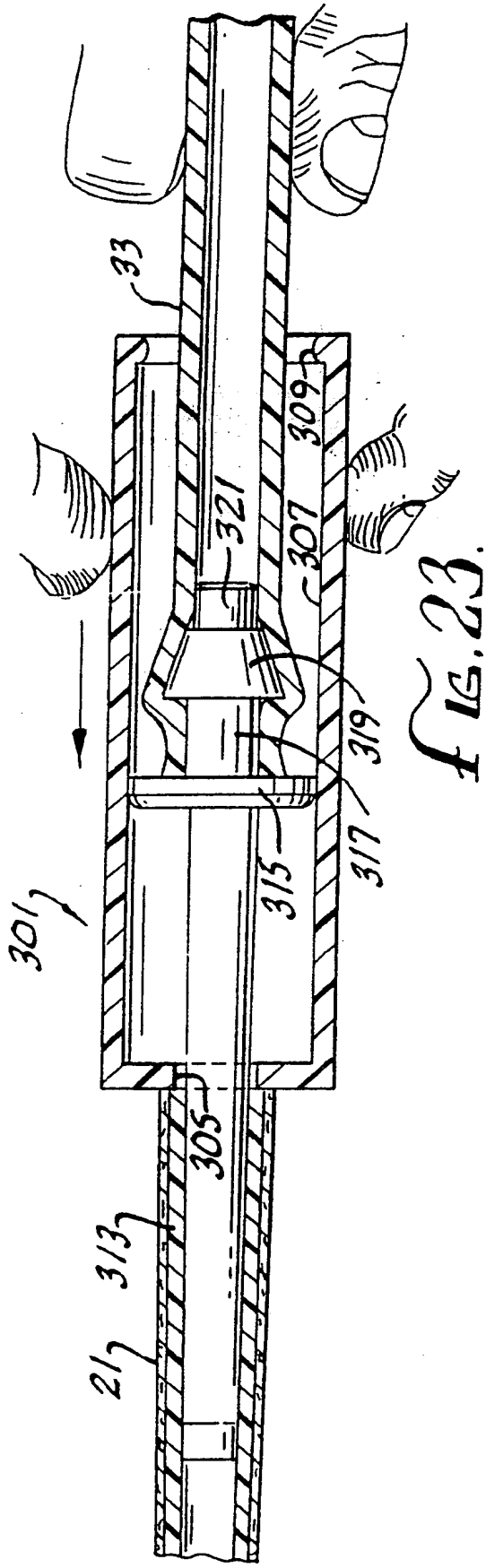

FIG. 23.

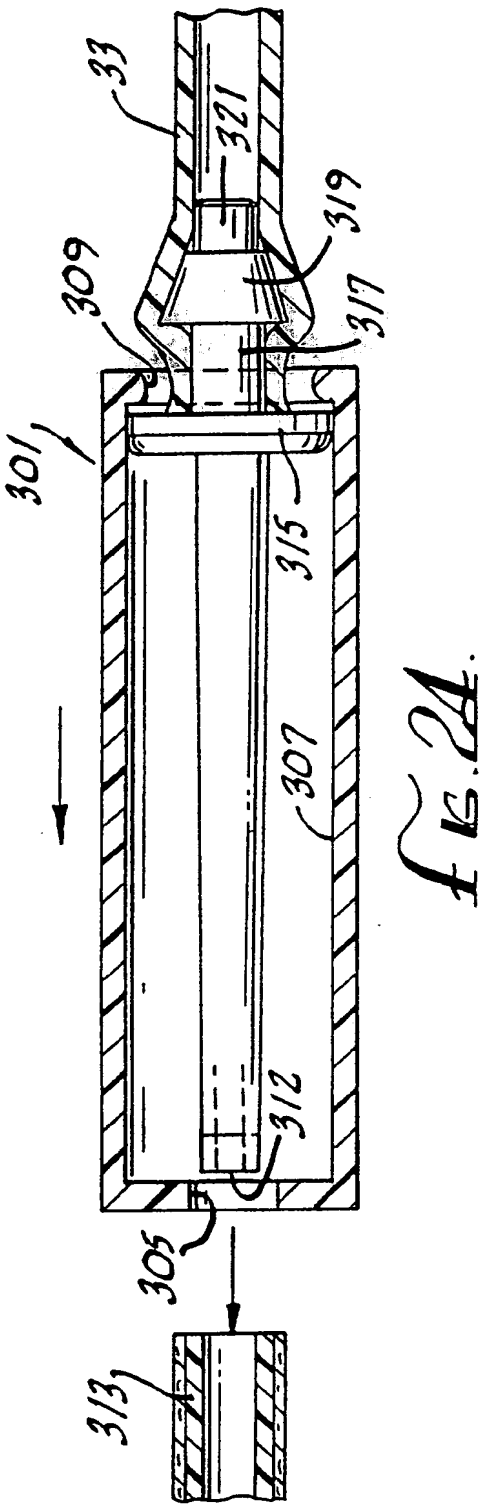

FIG. 24.

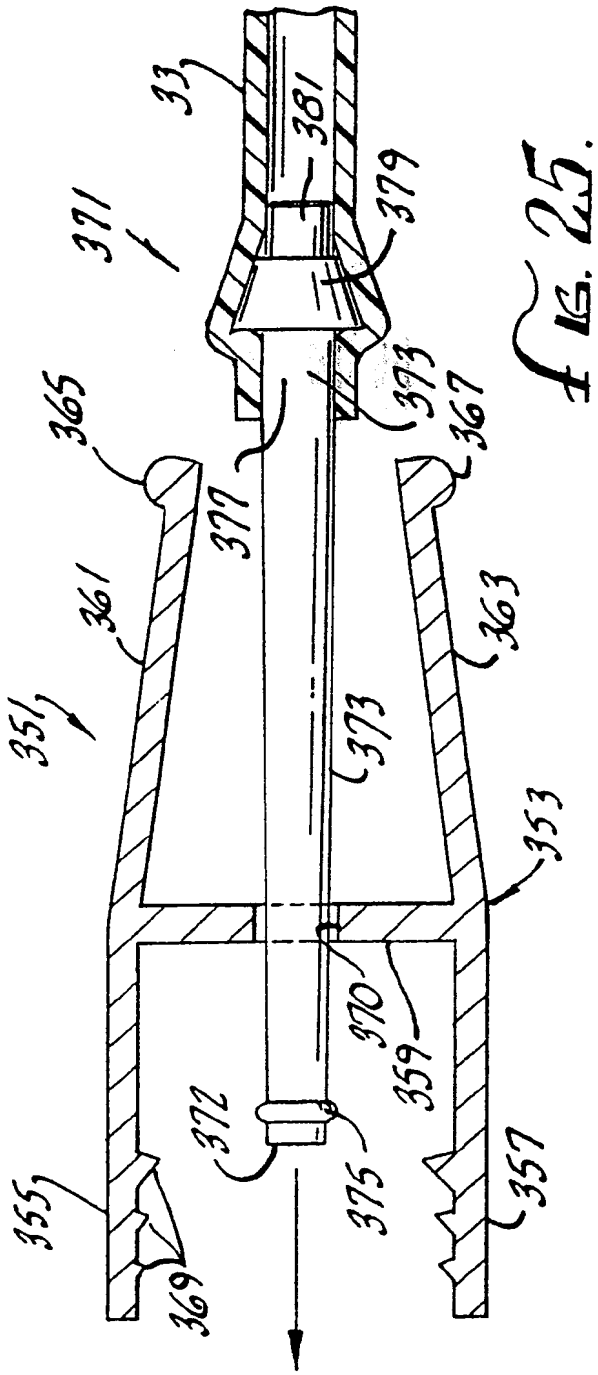

FIG. 25.

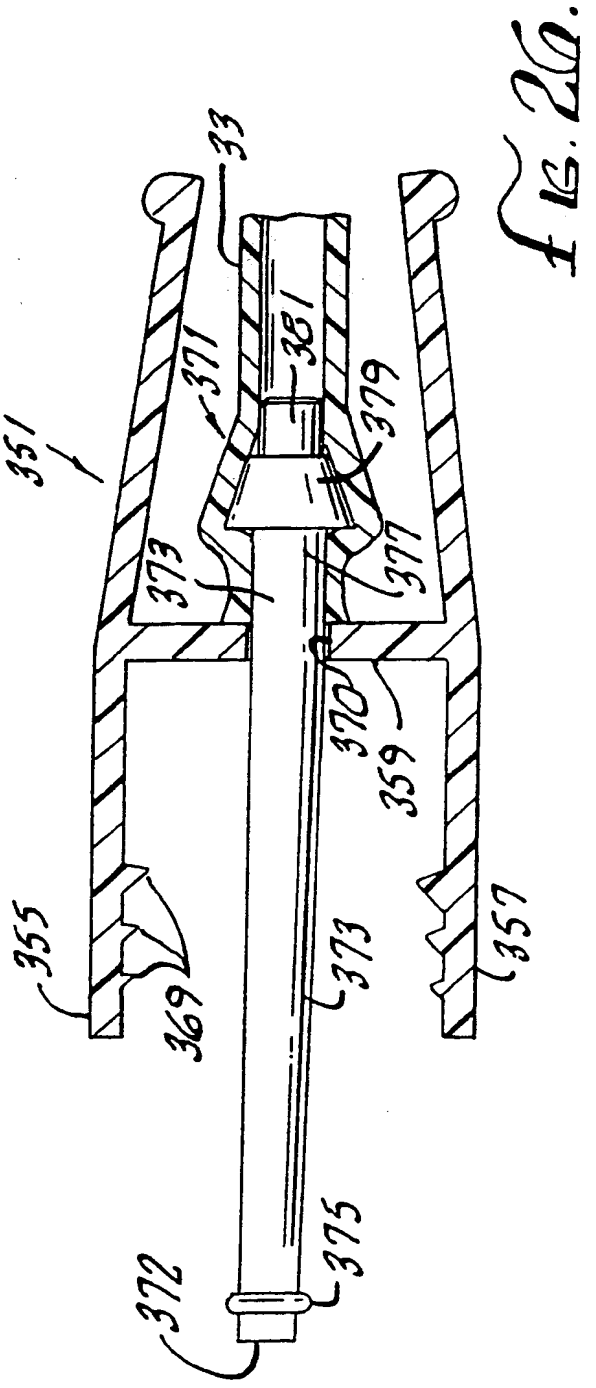

Fig. 26.

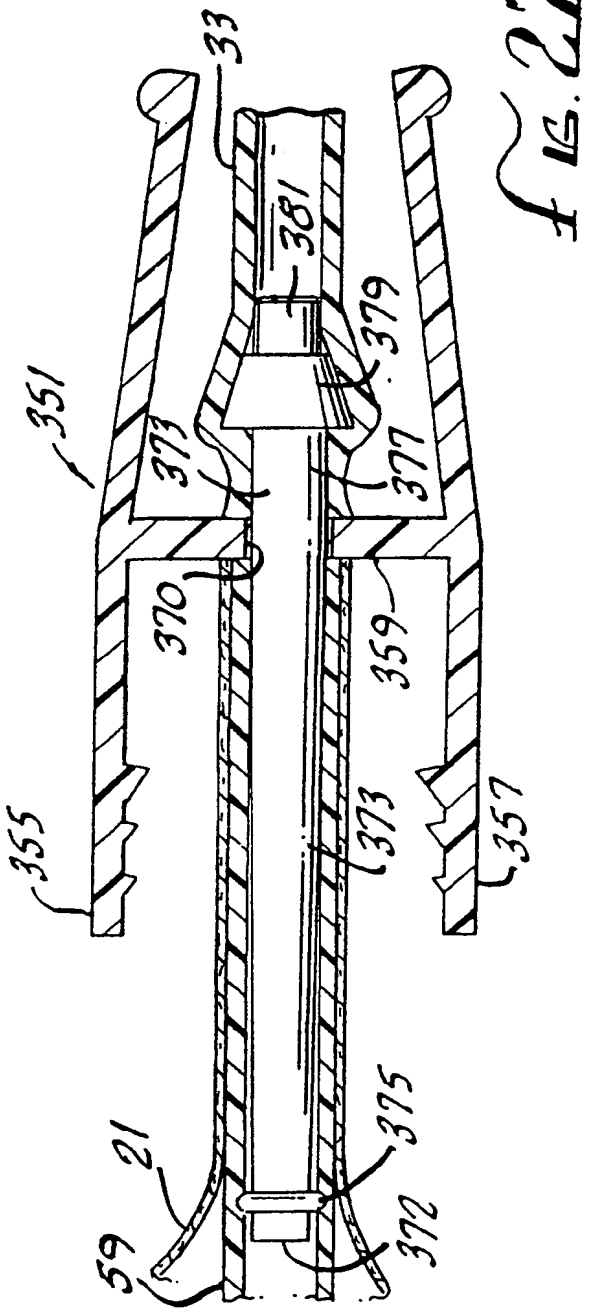

Fig. 27.

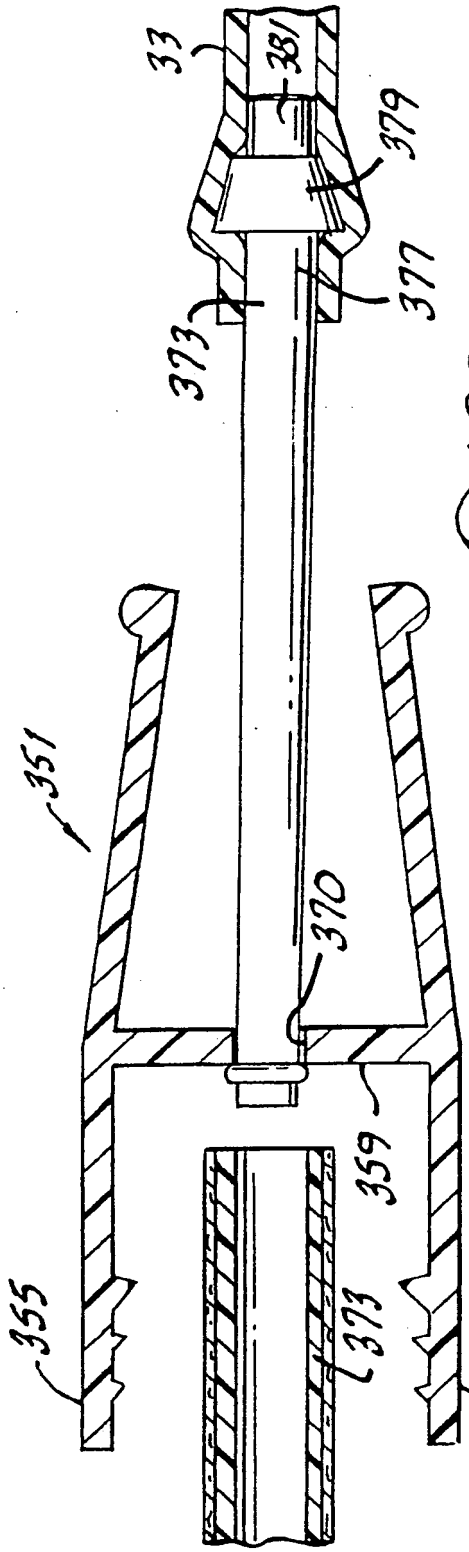

Fig. 28.

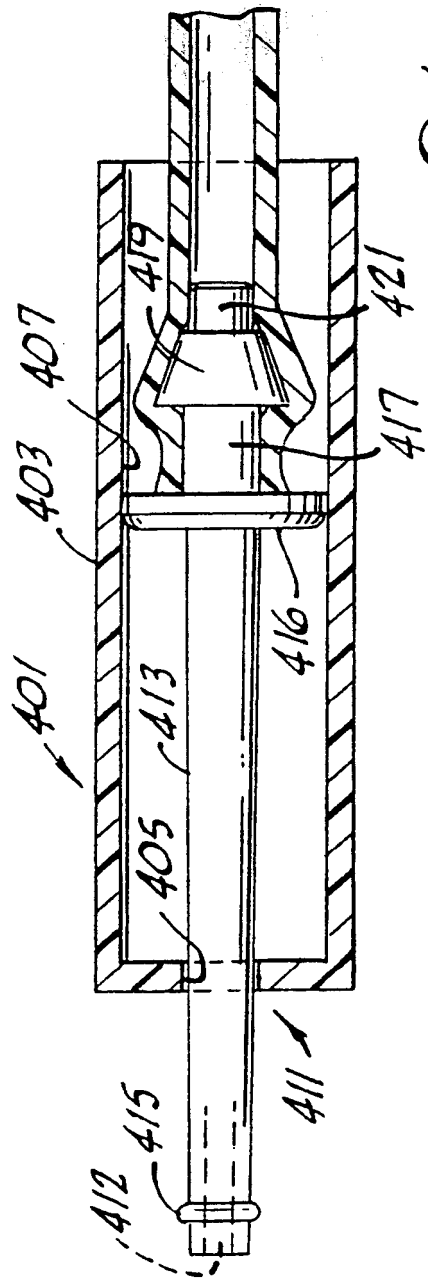

Fig. 29.

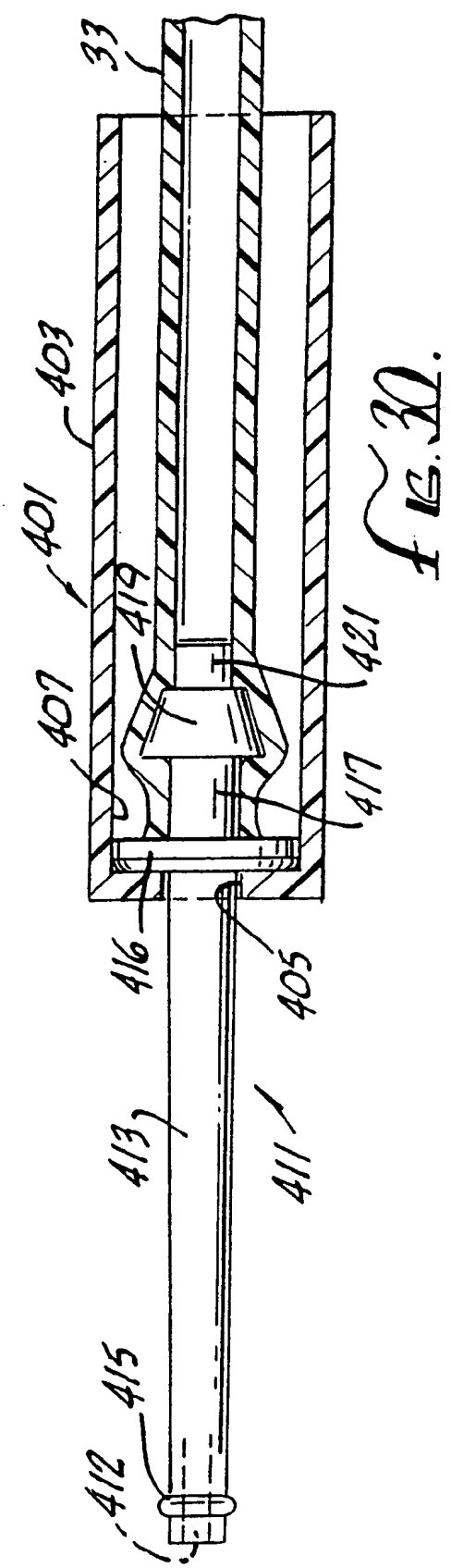

Fig. 30.

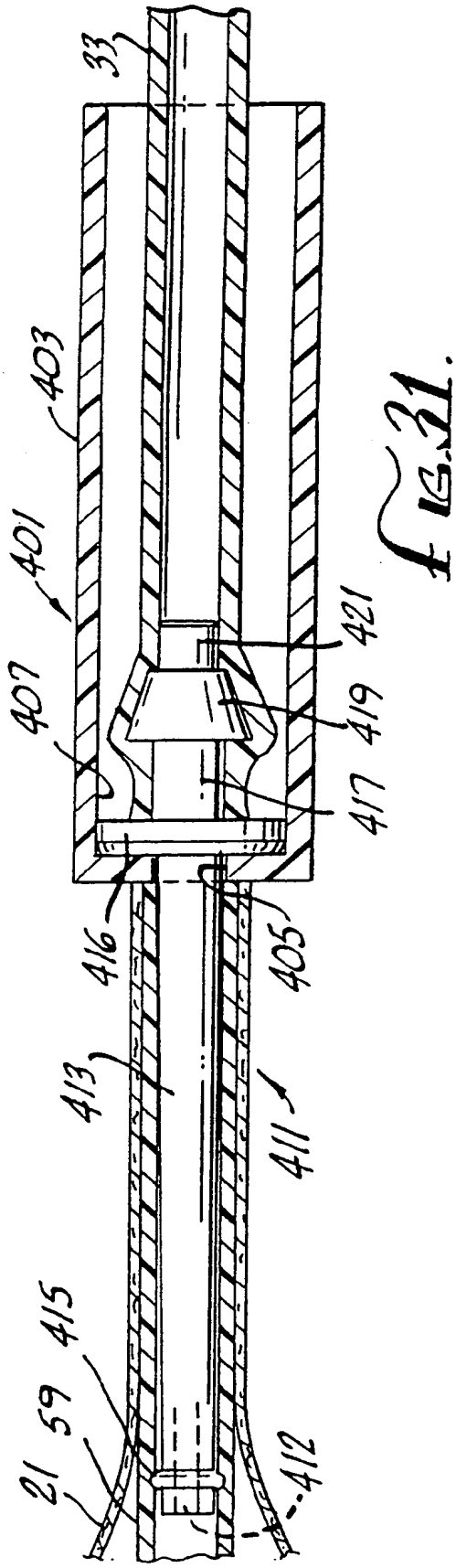

Fig. 31.

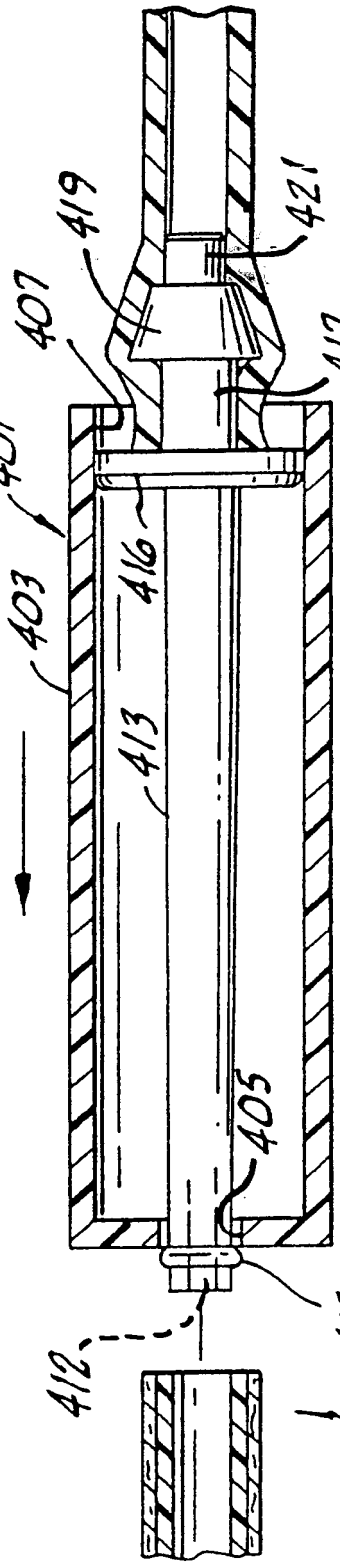

FIG. 32.

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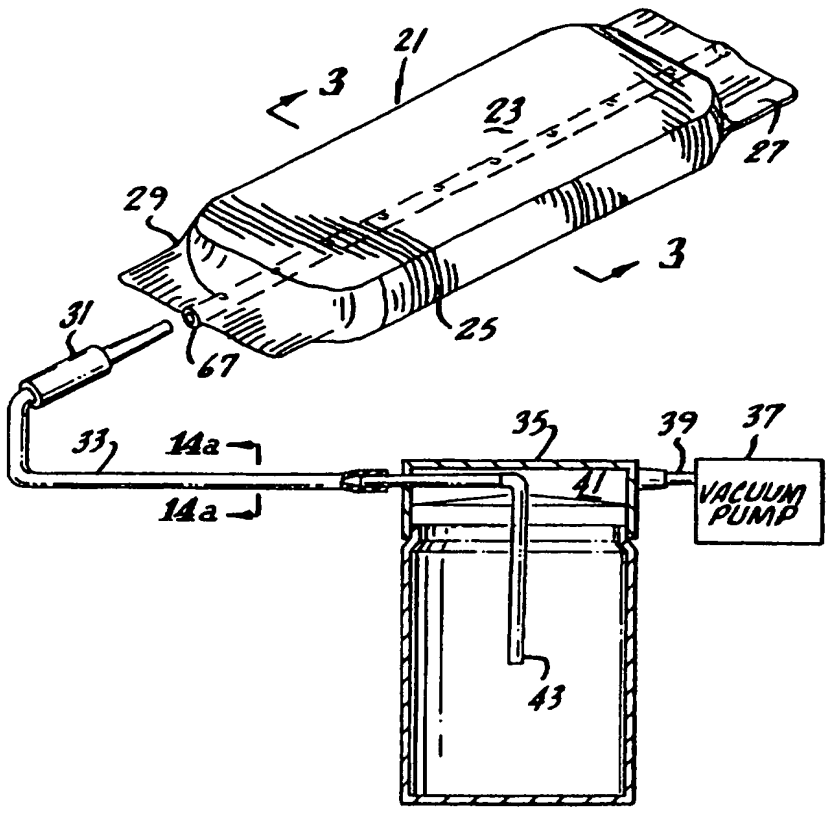
(54) Title: IMPROVED PAD AND PAD TUBE CONNECTOR FOR THE MANAGEMENT OF URINARY INCONTINENCE

(57) Abstract

An improved pad and pad tube connector is utilized with a urine aspiration system having a vacuum pump and collection reservoir. The improved pad utilizes a perforated tube, within its volume, and is surrounded by a wicking structure which wicks liquid away from the volume of the pad and towards the central perforated tube, and frictionally engages the absorptive material in the pad to provide greater pad stability. The improved connector of the present invention engages the centrally located perforated tube within the pad at a point near the end of the pad, as well as the material surrounding the pad, for a more secure attachment.



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AMENDED CLAIMS

[received by the International Bureau on 3 June 1993 (03.06.93); original claims 1-3,5-8,13 and 17 amended; original claims 4 and 43 cancelled; new claims 42-63 added (10 pages)]

1. An absorptive aspiratable pad comprising:

an elongate fluid impermeable lower liner, defining a planar surface forming the bottom and sides of said absorptive aspiratable pad;

a volume of absorbent material supported by and coextensive with said impermeable lower liner;

a first layer of wicking material extending substantially the length of said absorbent material, said first layer of wicking material in fluid contact with said volume of absorbent material;

an elongate tube having a multiplicity of perforations piercing the wall of said tube, said first layer of wicking material attached to said elongate tube;

a second layer of wicking material attached to said elongate tube and to said first layer of wicking material, said first and second layers of wicking material and said tube forming a wicked tube assembly wherein said first and said second layers of wicking material are directly attached to substantially the entire perimeter of said tube; and

a layer of essentially non-wetting, permeable material substantially enveloping said lower liner, said volume of absorbent material, and said wicked tube assembly.

2. The absorptive pad as recited in Claim 1, wherein said second layer of wicking is substantially coextensive with said first layer of wicking material to form an extended planar surface.

3. The absorptive pad as recited in Claim 2, wherein the extended planar surface of said first and said second layers of wicking material is substantially coextensive with the absorbent material.

5. The absorptive pad as recited in Claim 2, wherein the axis of the perforations are transverse to the axis of the tube, said first layer of wicking lies substantially in a plane, and said axis of said multiplicity of perforations of said tube are generally perpendicular to the plane of said first layer of wicking.

6. The absorptive pad as recited in Claim 2, wherein the axis of the perforations are transverse to the axis of the tube, said second layer of wicking lies substantially in a plane and said axis of multiplicity of perforations of said tube are generally perpendicular to the plane of said second layer of wicking.

7. The absorptive pad as recited in Claim 1, wherein the axis of the perforations are transverse to the axis of the tube, said axis of said multiplicity of perforations of said tube are generally perpendicular to said planar surface of said elongate fluid impermeable lower liner.

8. The absorptive pad as recited in Claim 1, and further comprising an inner layer of highly absorbent material enclosed by said non-wetting permeable layer of material and surroundably enclosing said volume of absorbent material, and said wicked tube assembly.

9. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies outside of and adjacent said volume of absorbent material opposite said elongate fluid impermeable lower liner.

10. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies outside of and adjacent said volume of absorbent material and adjacent said elongate fluid impermeable lower liner.

11. The absorptive pad as recited in Claim 10 and further comprising an inner layer of highly absorbent material enclosed by said non-wetting, permeable layer of material and surroundably enclosing said volume of absorbent pad.

12. The absorptive pad as recited in Claim 1, wherein the wicked tube assembly lies substantially within said volume of absorbent material.

13. The absorptive pad as recited in Claim 1, wherein said layer of essentially non-wetting, permeable material substantially enveloping said lower liner and said volume of absorbent material, sealably surrounds said wicked tube assembly.

14. The absorptive pad as recited in Claim 1, wherein said elongate tube is attached near said middle of said first layer of wicking material.

15. A tube connector for an absorptive pad comprising:

a flange having a front side and a rear side;

a pair of opposing jaws continuous with said front side of said flange;

a pair of opposing levers continuous with the rear side of said flange;

an extended snout continuous with the front side of said flange and extending between said pair of opposing jaws;

a circular fitting continuous with the rear side of said flange and extending between said pair of opposing levers.

16. The tube connector of Claim 15 wherein said elongated snout extends farther away from said flange than said pair of opposing jaws tube extends away from said flange.

17. The absorptive aspiratable pad as claimed in Claim 1 and further comprising:

a tube connector for an absorptive pad further comprising:

a flange having a front side and a rear side;

a pair of opposing jaws continuous with said front side of said flange;

a pair of opposing levers continuous with the rear side of said flange;

an extended hollow snout continuous with the front side of said flange and extending between said pair of opposing jaws, and inserted into said elongate tube;

a circular fitting continuous with the rear side of said flange and extending between said pair of opposing levers.

and wherein said elongated hollow snout extends sufficiently far into said elongate tube to internally seal any of said multiplicity of perforations not surrounded by at least one of said first and said second layers of wicking material.

18. The tube connector of Claim 15 wherein said pair of opposing levers extends farther away from said flange than said circular fitting extends away from said flange.

40. The tube connector of Claim 37 wherein said extended snout is tapered.

41. The tube connector of Claim 37 wherein said pair of opposing jaws each further defines a plurality of inwardly directed teeth.

42. An absorptive aspiratable pad comprising:

an elongate tube being porous at least a portion of its length, a wicking material covering at least the porous length of the tube, the wicking material comprising a first planar layer of wicking material and a second planar layer of wicking material, the first planar layer of wicking material being substantially coextensive with, being positioned on top of and in intimate contact with a planar surface of the second wicking material, the porous length of the tubing being located between and in intimate contact with a portion of the first planar layer and a portion of the second planar layer of wicking material, the wicking material and tube forming a wicked tube assembly;

a volume of bulk absorbent material coextensive with and in fluid contact with at least a portion of the wicking material; planar lower surface of said absorptive aspiratable pad, the elongate tube, wicking material and absorbent material being carried by the lower liner; and

a layer of essentially non-wetting, permeable material substantially enveloping said lower liner, volume of absorbent material and wicked tube assembly.

44. The absorptive pad of claim 42 wherein the first planar layer of wicking material, second planar layer of wicking material and the length of tube are attached together.

45. The absorptive pad of claim 42 wherein the wicking material is attached to substantially the entire perimeter of the tube.

46. The absorptive pad of claim 42 wherein the wall of the tube is pierced by a multiplicity of openings capable of transmitting liquid from the wicking material into the center of the tube.

47. The absorptive pad of claim 42 further comprising a highly absorbent inner layer enclosed by the non-wetting permeable material, said highly absorbent inner layer enclosing the bulk absorbent material and the wicked tube assembly.

48. The absorptive pad of claim 42 wherein a substantial portion of the bulk absorbent material lies between the wicked tube assembly and the elongate fluid impermeable lower liner.

49. The absorptive pad of claim 42 wherein the wicked tube assembly is surrounded by the bulk absorbent material.

50. The absorptive pad of claim 42 wherein the wicked assembly is located between the center of the bulk absorbent material and the elongate fluid impermeable lower liner.

51. An absorptive aspiratable pad comprising:

a volume of bulk absorbent material supported by and coextensive with a supporting material;

a first layer of absorbent material having wicking properties extending substantially the length of said bulk absorbent material, said first layer of absorbent material having wicking properties being in

fluid contact with said volume of bulk absorbent material;

an elongate tube having a multiplicity of perforations piercing the wall of said tube, said first layer of absorbent material having wicking properties being attached to said elongate tube;

a second layer of absorbent materials having wicking properties attached to said elongate tube, said first and second layers of absorbent material and said tube forming a wicked tube assembly wherein said first and said second layers of absorbent material having wicking properties are directly attached to substantially the entire perimeter of said tube; and

a layer of essentially non-wetting, permeable material covering at least the second layer of absorbent material having wicking properties;

the supporting material being an elongate fluid impermeable lower liner, defining a surface supporting the bulk absorbent material, the combination of the layer of essentially non-wetting, permeable material and elongate fluid impermeable lower liner substantially enveloping said volume of absorbent material and said wicked tube assembly.

52. The absorptive aspiratable pad of claim 51 wherein the bulk absorbent material substantially covers the length of the wicked tube assembly.

53. The absorptive aspiratable pad of claim 52 wherein a greater amount of bulk absorbent material is located between the wicked tube assembly and the non-permeable layer than between the wicked tube assembly and the non-wetting permeable materials.

54. The absorptive aspiratable pad of claim 52 wherein a greater amount of bulk absorbent material is

located between the wicked tube assembly and the non-wetting permeable material than between the wicked tube assembly and the non-permeable layer.

55. An absorptive aspiratable pad comprising:

an elongate tube being porous at least a portion of its length, a wicking material covering at least the porous length of the tube, the wicking material comprising a first layer of absorbent material having wicking properties and a second layer of absorbent material having wicking properties, the first layer of absorbent material being substantially coextensive with, being positioned on top of, and in intimate contact with the second absorbent material having wicking properties, the porous length of the elongate tube being located between and in intimate contact with a portion of the first layer of absorbent material and a portion of the second layer of absorbent material, the wicking material and the elongate tube forming a wicked tube assembly;

a volume of bulk absorbent material substantially coextensive with and in fluid contact with at least a portion of the wicked tube assembly; the wicked tube assembly and bulk absorbent material being carried by a lower liner; and

a layer of essentially non-wetting, permeable material covering at least the first layer of absorbent material, the combination of the lower liner and the non-wetting permeable material substantially enveloping said volume of bulk absorbent material and wicked tube assembly.

56. The absorptive aspiratable pad of claim 55 wherein the bulk absorbent material substantially covers the length of the wicked tube assembly.

57. The absorptive aspiratable pad of claim 56 wherein a greater amount of bulk absorbent material is located between the wicked tube assembly and the non-permeable layer than between the wicked tube assembly and the non-wetting permeable material.

58. The absorptive aspiratable pad of claim 56 wherein a greater amount of bulk absorbent material is located between the wicked tube assembly and the non-wetting permeable material than between the wicked tube assembly and the non-permeable layer.

59. An absorptive aspiratable pad comprising:

an elongate tubular structure being porous at least a portion of its length, the elongate tubular structure being sandwiched between absorptive materials having wicking properties, the absorptive materials being substantially coextensive with and in intimate contact with the elongate tubular structure, the elongate tubular structure and absorptive materials forming a wicked tube assembly; and

the wicked tube assembly coextensive with and in fluid contact with at least a portion of a bulk absorbent material, at least the wicked tube assembly being covered by a non-wetting permeable material and the bulk absorbent material being carried by a non-permeable lower liner, the combination of the non-wetting permeable material and the non-permeable lower liner fully enclosing the wicked tube assembly and the bulk absorbent material.

60. The absorptive aspiratable pad of claim 59 wherein the bulk absorbent material substantially covers the length of the wicked tube assembly.

61. The absorptive aspiratable pad of claim 60 wherein a greater amount of bulk absorbent material is located between the wicked tube assembly and the non-permeable layer than between the wicked tube assembly and the non-wetting permeable material.

62. The absorptive aspiratable pad of claim 61 wherein a greater amount of absorbent material is located between the wicked tube assembly and the non-wetting permeable material than between the wicked tube assembly and the non-permeable layer.

63. An absorptive aspiratable pad comprising:

a wicked tube assembly formed from an elongate porous tubular structure, the elongate porous tubular structure including absorptive materials having wicking properties; and

the wicked tube assembly coextensive with and in fluid contact with at least a portion of a bulk absorbent material, at least the wicked tube assembly being covered by a non-wetting permeable material and the bulk absorbent material being carried by a non-permeable lower liner, the combination of the non-wetting permeable material and the non-permeable lower liner fully enclosing the wicked tube assembly and the bulk absorbent material.

STATEMENT UNDER ARTICLE 19

Applicant has amended claims 1, 5, 6, 7 and 13 to more fully set forth the invention, and to correct some errors related to antecedent basis of certain terms used in the dependent claim.

Also added by this amendment are claims 42-63.

Claim 1 has been amended to include substantially all of claim 4 and claim 4 has been cancelled. Claim 2 has been amended to include the term "extended planar surface," as recited at page 16, lines 2-4 of the specification. "Predominate area" in claim 3 has been replaced by "extended planar surface" and "area of said volume of" has been eliminated.

Claim 8 has been amended to replace "pad" with --material--.

The structural description of the snout has been addressed by inserting --hollow-- before "snout."

Claim 42 has been amended by inserting --bulk-- at line 6 so that "bulk absorbent material" used in claim 47 and 48 has an antecedent basis. Further, claim 42 has been amended to include substantially all of the language of claim 43 and claim 43 has been cancelled.

By this amendment, applicant has also added new independent claims 51, 55, 59 and 63 and dependent claims 52-54, 56-58 and 60-62. The independent claims each include language substantially equivalent to the language of originally filed claim 4 along with additional language identifying features of the invention which result, in combination with language directed to a tubular structure sandwiched between wicking layers, in allowable subject matter. These new claims do not constitute new matter as they are fully encompassed within the originally filed specification and claims.

The newly added claims and the amendment to the claims previously filed do not present new matter. All the changes and additions are supported by various passages in the specification.